

# IDENTIFYING NORTHERN UTAH'S FLOWERING PLANTS

Mary E. Barkworth

An identification key is basically a series of paired statements. After reading both statements of a pair, you have to decide which of the two applies to your plant. Each statement will either end in a period or in the name of a group or a plant family, genus, or species. If the statement ends in a period, read the statement *immediately below* and its partner, which will have the same number but may appear directly below the first or some distance (even pages) away.

The keys presented here are based on those in Shaw's *Vascular Plants of Northern Utah*, published by Utah State University Press., but they have been modified in several respects. For instance, they now accommodate species that have been found in the region since publication of his work as well as additional species that are grown as garden plants or are used in teaching plant taxonomy at Utah State University. The language has also been modified, the general goal being to reduce the amount of unfamiliar words encountered. There is, however, no getting around the fact that describing plants (and, by extension, identifying them) requires expanding one's vocabulary. Enjoy it!

Another modification is designed explicitly to assist students in plant taxonomy. The key attempts to reflect the family treatment in Shaw AND that in *Plant Systematics* (Judd et al. 2002). The inames in CAPITAL letters reflect the interpretation of Judd et al. those in italics are those used in Shaw. The names in CAPITALS are a more accurate reflection of the phylogeny of flowering plants, as this is now understood, but there are many floras that have stayed with a more traditional family interpretation. The use of both systems will, it is hoped, assist those learning plant taxonomy in this time of active discussion and research..

A word of warning: These keys are designed to work in northern Utah. The further away you are from northern Utah, the less likely they are to work, but learning to use these keys will make it easier for you to work with other keys, including those appropriate for work in other parts of the world. Expect to struggle a bit when first using a new flora. Every author has his or her own style.

Never forget to enjoy the plants. They are wondrously diverse and, just as you thought you had begun to appreciate all the different ways they could put their parts together, you will come across one with a new twist. Have fun!

This key reflects the families as recognized by Shaw, not as recognized in the Judd et al. (2002), the text book used in Bio 3400 at USU. Most families are similar to those in *A Utah Flora* (Welsh et al. 1993), but I have followed Shaw in using the formulaic names for all the families whereas Welsh et al. use the traditional names when the choice is permitted by the International Code of Botanical Nomenclature. The following table shows the equivalencies.

<b>Formulaic Name</b>	<b>Traditional (and more descriptive) name</b>
<i>Apiaceae</i>	<i>Umbelliferae</i>
<i>Brassicaceae</i>	<i>Cruciferae</i>
<i>Fabaceae</i> (but Shaw treats <i>Caesalpinaceae</i> and	<i>Leguminosae</i> – which includes the <i>Caesalpinaceae</i>
<i>Lamiaceae</i>	<i>Labiatae</i>
<i>Poaceae</i>	<i>Gramineae</i>

Decision 1: Is your plant a monocot or not?

Before starting into the formal key for identifying North Utah's plants to family, you need to make an important decision: Is your plant a monocot or not? To make this decision, use the table below. Base your decision on at least two of the above characters. There are exceptions to almost every statement, certainly to all the more easily observed characters.

In traditional treatments, flowering plants were divided into monocots and dicots. It was recognized that some dicots, particularly dicots that belonged to what were considered primitive families, often had many monocot characteristics such as perianth parts in multiples of three and scattered vascular bundles. The explanation was that monocots were derived early on from within the dicots. Current work in phylogeny supports this interpretation but, if all recognized groups are to be monophyletic, then the old group dicots falls by the wayside. The dicots that form a single lineage after divergence of the monocots are called Eudicots (from the Greek prefix *eu* meaning "true"). There are some families that are thought to have emerged somewhere around the same time as the monocot lineage that are not eudicots but, for identification purposes, this does not matter. It is enough to divide the families into Monocot and Non-monocot families. .

MONOCOTS	NON-MONOCOTS ( <i>DICOTS</i> )
Perianth parts are in multiples of 3.	Perianth parts usually in multiples of 4 or 5
Primary leaf veins are 'parallel'.	Primary leaf veins are not parallel.
Stems have scattered vascular bundles.	Stems often have a circle of vascular bundles.
Usually do not form branched woody plants	Plants often highly branched and woody..
Seeds have a single cotyledon	Seeds have two cotyledons.
Primary roots abort; all functional roots are adventitious.	Primary roots often do not abort; secondary roots also formed.
Pollen grains are monocolpate <sup>1</sup> or monocolpate derived.	Pollen grains are tricolpate <sup>2</sup> or tricolpate derived.
<b>GO TO KEY FOR <a href="#">MONOCOTS</a></b> (Page 12)	<b>GO TO KEY FOR <a href="#">NON-MONOCOTS</a></b> (Page 3)

<sup>1</sup> Have one groove. This is not really a useful identification characteristic; treat it as free information.

<sup>2</sup> Have three round grooves. Similarly, this should be regarded as a free but unnecessary tidbit.

## NON-MONOCOT FAMILIES

Shaw: Dicotyledonae (Class Magnoliopsida)

Plants herbaceous or woody; stems with vascular bundles in a ring; primary veins of leaves not parallel, usually with evident secondary and tertiary forming an evident netlike structure (this is what is meant by reticulate venation, a phrase often found in textbooks), floral parts usually 4 or 5-merous; pollen typically tricolpate.

### Decision 2: Which Non-monocot group does your plant belong to?

The non-monocot families are divided here into eight groups. This makes identification a bit less intimidating because the groups are fairly easy to identify. The groups are artificial, being based solely on their possession of a set of easy identifiable characteristics. That is why the description of each group contains no more information than the characteristics used to form them.

1. Plants usually yellow, orange, red, or purple-brown or yellow-green and growing on a coniferous tree as an epiphyte; all plants under this lead are parasitic or saprophytic. .... [Group 1](#)
1. Plants green, usually not evidently parasitic or saprophytic (several plants that key out here are root parasites but, unless they are carefully dug up, it is not evident that they are semi-parasitic, receiving some of their nutrition from another plant species).
2. Plants obligate<sup>1</sup> aquatics, either floating or, if rooted in soil, the majority of the plant body underwater..... [Group 2](#)
2. Plants growing in dry or wet places, rooted in soil or on another plant, the majority of the plant body growing in air.
3. Plants leafless, succulent, usually with several clusters of sharp spines over the body; stamens many<sup>2</sup> and thigmotropic<sup>3</sup> ..... CACTACEAE
3. Plants with leaves, usually not succulent, the bodies without several clusters of sharp spines; stamens few to many, not thigmotropic.
4. Flowers individually small, without pedicels<sup>4</sup>, aggregated into heads<sup>5</sup> and surrounded by an involucre<sup>6</sup>.
5. Stamens 5, their anthers usually united in a ring around the style; leaves alternate, opposite, or whorled; inflorescences often with radially symmetric flowers in the center and bilaterally symmetric flowers on the outside, sometimes all flowers alike..... ASTERACEAE
5. Stamens 2-4, their anthers separate; leaves opposite or whorled; flowers all alike within a head, bilaterally symmetric .....DIPSACACEAE
4. Flowers small or large, usually with pedicels, never both without pedicels and with an involucre.
6. Plants herbaceous, with milky juice when fresh; flower parts really difficult to figure out without help; style top lat and pentagonal in shape if a corolla is present, divided into three branches if no corolla is present.
7. Flowers unisexual, individually hard to identify, grouped together in a cyathium<sup>7</sup>; pistillate flowers consisting of a stalked ovary with 3-well-developed style branches, the ovary usually visible above the margin of the cyathium at maturity. .... EUPHORBIACEAE

<sup>1</sup> **Obligate:** Absolutely has to be this way. Plants that can survive flooding, or require flooding for a short period of time are not *obligate* aquatics. Duckweed is an *obligate* aquatic. Many families have a few species that are obligate aquatics.

<sup>2</sup> **Many:** To a botanist, this usually means more than twice the number of petals or more than 10.

<sup>3</sup> **Thigmotropic:** Moves toward something that touches it. Poke your finger into the stamens of a cactus and it will be covered with pollen. Bindweed is also thigmotropic – it helps it climb.

<sup>4</sup> **Pedicels:** Stalk to a flower

<sup>5</sup> **Heads:** See inflorescence diagrams

<sup>6</sup> **Involucre:** Green bracts surrounding or subtending a *group* of flowers.

<sup>7</sup> **Cyathium:** A cuplike structure that sometimes has a colorful rim that makes it look like a flower; found only in *Euphorbia* and its relatives. See inflorescence diagrams.

- 7. Flowers bisexual, easy to identify as such, usually in umbels<sup>8</sup>; pistil with 2 separate ovaries but an unbranched style that ends in a flat, pentagonal surface .....ASCLEPIADACEAE
- 6. Plants herbaceous or woody, usually without milky juice even when fresh; flower parts often easy to recognize (wind pollinated plants, which often have little or no perianth, can be tough in this regard).
- 8. Perianth<sup>9</sup> consisting of only 1 whorl, this usually not colorful, or of two whorls but the corolla inconspicuous being both small and drab.
  - 9. Plants definitely woody, trees, shrubs, or vines.....[Group 3](#)
  - 9. Plants herbaceous, sometimes woody at the base.....[Group 4](#)
- 8. Perianth with two whorls, the corolla sometimes small but colorful.
  - 10. Corolla of united petals, the whole corolla coming off when one part of it is tugged.....[Group 5](#)
  - 10. Corolla of separate petals, the petals coming off individually when tugged.
  - 11. Corolla and calyx attached to a hypanthium<sup>10</sup>, the hypanthium attached to the receptacle or ovary .....[Group 6](#)
  - 11. Corolla and calyx attached directly to the receptacle or top of the ovary.
    - 12. Number of stamens more than twice as many as the petals.....[Group 7](#)
    - 12. Number of stamens up to twice as many as the petals .....[Group 8](#)

## Group 1

Plants obviously parasitic or saprophytic, sometimes epiphytic.

- 1. Plants parasitic on aerial branches of coniferous trees, yellow-green to green; leaves opposite<sup>11</sup> ..... VISCACEAE
- 1. Plants parasitic but not on aerial branches of coniferous trees, not green; leaves alternate or opposite.
  - 2. Stems twining on host plants, vine-like; plants usually orange or yellow.....CUSCUTACEAE
  - 2. Stems erect, not vine-like, yellowish or purple-brown.
    - 3. Corolla bilaterally symmetric; stamens 4; plants 3–25 cm tall ..... OROBANCHACEAE
    - 3. Corolla radially symmetric or almost so; stamens 5–10; plants 30-60 cm tall .....PYROLACEAE

## Group 2

Plants obligate aquatics.

Many of the families that key out here also key out in other groups because they contain species that are not obligate aquatics as well as some that are..

- 1. Submerged leaves dissected into linear or filiform segments; floating or aerial leaves often quite different in shape.
  - 2. Flowers inconspicuous, borne in the axils<sup>12</sup> of leaves or sessile<sup>13</sup> in a terminal spike<sup>14</sup>; corolla lacking or quickly deciduous.
  - 3. Plants mostly free-floating; roots usually absent .....CERATOPHYLLACEAE

<sup>8</sup> **Umbel:** All flowers on pedicels of equal length that are joined to the stem at the same point. See inflorescence diagrams.

<sup>9</sup> **Perianth:** The two non-reproductive whorls of a flower, the corolla and calyx)

<sup>10</sup> **Hypanthium:** Cuplike or tube like structure formed of undifferentiated perianth tissue but eventually differentiating into a calyx and corolla. Check for a hypanthium by looking at the underside of the flower. Is the calyx and corolla differentiated at the pedicel (no hypanthium) or some distance from it (hypanthium present)? If the perianth is attached above the base of the ovary, is there is stretch of tissue before the calyx and corolla become separate? If yes, there is a hypanthium; if no, there is no hypanthium.

<sup>11</sup> **Opposite leaves:** two leaves at a node, often on either side of the stem.

<sup>12</sup> **Axil:** Angle between the leaf and the stem.

<sup>13</sup> **Sessile:** without a stalk.

<sup>14</sup> **Spike:** Flowers sessile on an elongate axis. See inflorescence diagrams.

- 3. Plants rooted.....HALORAGACEAE
- 2. Flowers conspicuous, borne on naked pedicels or peduncles<sup>15</sup>.
  - 4. Corolla united, bilaterally symmetric ..... LENTIBULARIACEAE
  - 4. Corolla with separate petals, radially symmetric..... RANUNCULACEAE
- 1. Leaves all similar, never dissected into linear or filiform segments..
  - 5. Leaves all basal and simple<sup>16</sup>.
    - 6. Flowers solitary and radially symmetric; perianth composed of several to many sepals, the inner sepals petal-like and bright yellow; flowers solitary; leaves strongly cordate<sup>17</sup> at the base..... NYMPHAEACEAE
    - 6. Flowers never solitary, bilaterally symmetric; perianth with a distinct calyx and corolla; sepals 5, green; leaves usually tapering to the base, not strongly cordate..... SCROPHULARIACEAE
  - 5. Leaves not all basal or, if so, the leaves trifoliate<sup>18</sup>.
    - 7. Leaves opposite or whorled<sup>19</sup>.
      - 8. Corollas conspicuous, blue; flowers in axillary racemes..... SCROPHULARIACEAE
      - 8. Corollas inconspicuous or lacking; flowers sessile, short-pedicellate, or solitary.
        - 9. Leaves whorled, giving the stem a “bottle-brush” appearance; corolla lacking; stamen 1 ..... HIPPURIDACEAE
        - 9. Leaves opposite, sometimes appearing whorled; corolla present or absent; stamens 1 or 4.
          - 10. Leaves united around the stem at the base, forming a sheath; corolla with 4 petals; stamens 4..... CRASSULACEAE
          - 10. Leaves not united around the stem at the base; corolla absent; stamens 1 ..... CALLITRICHACEAE
    - 7. Leaves alternate or appearing basal.
      - 11. Leaves simple, entire<sup>20</sup> ..... POLYGONACEAE
      - 11. Leaves either compound or not entire.
        - 12. Leaves trifoliate and appearing all basal ..... MENYANTHACEAE
        - 12. Leaves pinnately compound<sup>21</sup> or palmately lobed<sup>22</sup>, more or less evenly distributed on the stems.
          - 13. Leaves pinnately compound ..... BRASSICACEAE
          - 13. Leaves palmately lobed ..... RANUNCULACEAE

### Group 3

Plants woody, trees, shrubs, or vines. Flowers either with only one perianth whorl, deemed to be the calyx even if colored, or corolla small, drab, and inconspicuous.

- 1. Plants vines, sometimes growing along the ground.
  - 2. Leaves opposite; stamens and pistils many ..... RANUNCULACEAE
  - 2. Leaves alternate; stamens and pistils 3-merous ..... ARISTOLOCHIACEAE
- 1. Plants trees or shrubs.
  - 3. Leaves compound
    - 4. Leaves alternate; fruit a nut<sup>23</sup> ..... JUGLANDACEAE
    - 4. Leaves opposite; fruit a samara<sup>24</sup>.
      - 5. Leaflets 3; fruit with two seeds and two wings, one wing per seed, the fruit eventually separating into two parts ..... ACERACEAE

<sup>15</sup> **Peduncle** stalk to a flower cluster; pedicels are stalks to individual flowers.

<sup>16</sup> **Simple leaves:** leaves without leaflets. See leaf structures.

<sup>17</sup> **Cordate:** Heart shaped. See leaf structures.

<sup>18</sup> **Trifoliate:** Divided into three parts.

<sup>19</sup> **Whorled leaves:** three or more leaves attached at the same node. See leaf structures.

<sup>20</sup> **Entire margins:** smooth edged, without teeth or bumps. See leaf structures.

<sup>21</sup> **Pinnately lobed:** lobed and with an elongate central axis, like a feather. See leaf structures.

<sup>22</sup> **Palmately lobed:** lobed around a basal point, like the fingers of a hand. See leaf structures.

<sup>23</sup> **Nut:** Fruit with a hard woody exterior and a single seed inside. See fruit types.

<sup>24</sup> **Samara:** Fruit with wings (thin, membranous margin or extension). See fruit types.

- 5. Leaflets 3-7; fruit with one seed, the fruit remaining intact, even in great age .....OLEACEAE
- 3. Leaves simple.
  - 6. Flowers unisexual; pistillate flowers in stiff, cylindrical or spherical inflorescences; staminate flowers in catkins<sup>25</sup> or ball-shaped inflorescences<sup>26</sup>.
  - 7. Leaves palmately 3-7 lobed but the margins entire; flowers in spherical inflorescences; fruit an obconic<sup>27</sup>, 1-seeded achene<sup>28</sup> ..... PLATANACEAE
  - 7. Leaves unlobed or irregularly lobed, the margins serrate<sup>29</sup> to dentate<sup>30</sup>; flowers in cylindrical to spherical inflorescences; fruit fleshy, resembling a raspberry ..... MORACEAE
  - 6. Flowers bisexual or unisexual, if unisexual the pistillate flowers in various kinds of inflorescences but not in stiff, globose inflorescences, the staminate flowers often in catkins.
  - 8. Flowers always unisexual; staminate flowers in catkins.
    - 9. Plants dioecious<sup>31</sup>; fruit a capsule with numerous seeds, each bearing a tuft of hairs; all flowers attached individually directly to their inflorescence axis ... SALICACEAE
    - 9. Plants monoecious<sup>32</sup>; fruit a 1-seeded, winged achene or nut; staminate flowers attached in clusters to the inflorescence axis; pistillate flowers in catkins or solitary.
    - 10. Leaf margins usually dentate to serrate; fruit a 2-winged achene or a nut enclosed in a leafy cylinder derived from 2-3 bracts .....BETULACEAE
    - 10. Leaves usually lobed but the margins entire; fruit a nut subtended at the base by a cupule apparently composed of numerous, small bracts fused into a cuplike structure .....FAGACEAE
  - 8. Flowers bisexual or unisexual; flowers never in catkins.
  - 11. Leaves opposite or almost so.
    - 12. Leaves palmately lobed and simple; fruit a schizocarpic<sup>33</sup> samara with two seeds..... ACERACEAE
    - 12. Leaves unlobed, sometimes compound; fruit an achene, drupe, or a samara with one seed.
    - 13. Leaves with silvery or brown scales; fruit an achene enclosed in the red or silvery-gray persistent hypanthium ..... ELEAGNACEAE
    - 13. Leaves glabrous<sup>34</sup>; fruit a samara or blackish drupe<sup>35</sup> ..... OLEACEAE
  - 11. Leaves alternate.
    - 14. Secondary veins of leaves parallel and conspicuous; leaf bases often oblique ..... ULMACEAE
    - 14. Secondary veins of leaves not parallel, frequently inconspicuous.
      - 15. Hypanthium not present; styles 2-3; fruit a utricle or achene; plants often in saline habitats .....CHENOPODIACEAE
      - 15. Hypanthium present; style 1, sometimes with well-developed branches; fruit an achene with a plumose style, or a drupe with 1 or 3 seeds.
      - 16. Style more or less plumose<sup>36</sup> in fruit; stamens numerous ..... ROSACEAE
      - 16. Style not persistent in fruit; stamens 4 or 5 .....RHAMNACEAE

<sup>25</sup> **Catkins:** flexible, elongate inflorescences.

<sup>26</sup> **Inflorescence:** Cluster of flowers on a branch. See inflorescence types.

<sup>27</sup> **Obconic:** cone-shaped, but with the widest part of the cone furthest from the base of the flower.

<sup>28</sup> **Achene:** Fruit with tough, almost woody, outer wall and a single seed inside that is not hard to separate from the ovary wall. See fruit types.

<sup>29</sup> **Serrate:** Margins like the teeth of a saw, pointing forward. See leaf structures.

<sup>30</sup> **Dentate:** Margins with teeth that stick more or less straight out. See leaf structures.

<sup>31</sup> **Dioecious:** Plants with unisexual flowers, individual plants with staminate or pistillate flowers but not both.

<sup>32</sup> **Monoecious:** Plants with unisexual flowers, the staminate and pistillate flowers in separate inflorescences but on the same plant.

<sup>33</sup> **Schizocarpic:** splitting at maturity into two or more parts

<sup>34</sup> **Glabrous:** Without hairs or scales.

<sup>35</sup> **Drupe:** Fruit that is fleshy on the outside, containing one or more seeds, the seeds surrounded by a woody wall. See fruit types.

<sup>36</sup> **Plumose:** Feathery, the hairs flexible and wavy.

## Group 4

Plants herbaceous; flowers with a single perianth whorl (deemed to be the calyx) or the corolla small, drab, and inconspicuous.

1. Ovary more or less inferior, partly or wholly fused with the base of the calyx ..... SANTALACEAE
1. Ovary superior, free from the calyx although sometimes surrounded by it.
  2. Perianth completely absent; plants with milky juice when fresh ..... EUPHORBIACEAE
  2. Calyx present, often petaloid in appearance; plants without milky juice.
    3. Pistils more than 1 per flower..... RANUNCULACEAE
    3. Pistil 1 per flower.
      4. Hypanthium present.
        5. Leaves alternate; stipules present..... ROSACEAE
        5. Leaves opposite; stipules lacking.
          6. Stamens many; fruit a circumscissile capsule; leaves fleshy ..... AIZOACEAE
          6. Stamens 3-5; fruit an achene; leaves not fleshy ..... NYCTAGINACEAE
      4. Hypanthium absent.
        7. Style unbranched.
          8. Leaves dentate, often with stinging hairs; calyx not tubular ..... URTICACEAE
          8. Leaves not dentate, without stinging hairs; calyx tubular, petaloid, subtended by bracts that often form a calyx-like involucre; ..... NYCTAGINACEAE
        7. Style branched, at least distally.
          9. Leaves deeply palmately 5-7 lobed or compound; flowers unisexual.. CANNABINACEAE
          9. Leaves not deeply lobed, always simple; flowers unisexual or bisexual.
            10. Fruit a capsule with several to many seeds; leaves opposite... CARYOPHYLLACEAE
            10. Fruit a 1-seeded achene or utricle; leaves alternate or opposite.
              11. Calyx 3-merous; stamens 3,6, or 9; stipules often forming a hyaline sheath around the stem ..... POLYGONACEAE
              11. Calyx of 1, 4, or 5 lobes or sepals.
                12. Bracts subtending the flowers not scarious; plants often mealy, scaly or fleshy ..... CHENOPODIACEAE
                12. Bracts subtending flowers scarious; plants not mealy, scaly, or fleshy ..... AMARANTHACEAE

## Group 5

Plants with united corollas.

To go this route, ALL the petals must be united together into a single structure. None of the members of the Fabaceae should not be taken through this route because only the lower two petals are fused (and that only lightly); the remainder are separate.

1. Ovary inferior or partly so
  2. Stamens united by their anthers
    3. Plants with tendrils ..... CUCURBITACEAE
    3. Plants without tendrils ..... CAMPANULACEAE
  2. Stamens distinct
    4. Leaves alternate; stamens 5 ..... CAMPANULACEAE
    4. Leaves opposite or whorled; stamens 5 or fewer
      5. Flowers bilaterally symmetric
        6. Plants herbaceous; stamens 1-3; calyx conspicuous on fruit, essentially invisible in flower ..... VALERIANACEAE
        6. Plants woody; stamens 4-5; calyx never conspicuous, lobes usually visible ..... CAPRIFOLIACEAE
    5. Stamens 2,4, or 5; flowers usually radially symmetric.

- 7. Ovary 1-loculed; flowers in heads subtended by a whorl or whorls of bracts, these usually green; fruit an achene ..... DIPSACACEAE
- 7. Ovary 2-5-loculed; flowers not in heads; fruit not an achene.
  - 8. Plants herbaceous; ovary 2-loculed; stems square in cross-section..... RUBIACEAE
  - 8. Plants shrubs; ovary 3-5-loculed; stems round in cross-section ..... CAPRIFOLIACEAE
- 1. Ovary superior
  - 9. Stamens more than 5
    - 10. Petals united almost to the top, urn-shaped or tubular..... ERICACEAE
    - 10. Petals united only at the base.
      - 11. Pistils 4-5; plants succulent with simple leaves ..... CRASSULACEAE
      - 11. Pistils 1; plants not both succulent and with simple leaves
        - 12. Corolla bilaterally symmetric, the petals evidently dissimilar.
          - 13. Petals 4, in 2 dissimilar pairs; sepals 2; leaves dissected ..... FUMARIACEAE
          - 13. Petals 3 but appearing to be 5 because of the 2 petal-like sepals .... POLYGALACEAE
        - 12. Corolla radially symmetric.
          - 14. Flowers small, in dense heads or spikes; fruit a legume ..... FABACEAE
          - 14. Flowers not as above; fruit not a legume.
            - 15. Stamens numerous, united in a tube around the pistil ..... MALVACEAE
            - 15. Stamens 10, united only at the base ..... OXALIDACEAE
    - 9. Stamens 5 or fewer (except in *Bougainvillea* of the *Nyctaginaceae*, a greenhouse plant in Utah).
      - 16. Corolla more or less bilaterally symmetric.
        - 17. Fruit of 2-4 nutlets; leaves opposite.
          - 18. Ovary not lobed; style apical, entire ..... VERBENACEAE
          - 18. Ovary 4-lobed; style arising from the between the corolla lobes and cleft at the apex ..... [LAMIACEAE](#)
        - 17. Fruit a capsule.
          - 19. Ovary 1-loculed; leaves often softly velvety; indoor plants in northern Utah..... GESNERIACEACEAE
          - 19. Ovary 2-loculed; leaves seldom velvety; many plants native or able to persist outside in northern Utah.
            - 20. Seeds winged; placentation parietal; fruit a capsule more than 5 inches long ..... BIGNONIACEAE
            - 20. Seeds not winged; placentation axile.
              - 21. Stamens 2; calyx with a pair of small bracts at the base; indoor plant only in northern Utah..... ACANTHACEAE
              - 21. Stamens 2,4, or 5; calyx without any bracts at the base; *many* species growing outside in northern Utah..... [SCROPHULARIACEAE](#)
        - 16. Corolla radially symmetric.
          - 22. Ovaries 2 but style and stigma 1; plants often with milky juice (check when fresh).
            - 23. Stamens visible, the anthers touching each other (but not fused) around the stigma ..... APOCYNACEAE
            - 23. Stamens not evident, the anthers attached to the pistil..... ASCLEPIADACEAE [The *Apocynaceae* and *Asclepediaceae* are closely related and sometimes treated as a single family which, by the rules that govern the naming of plants, is called *Apocynaceae*, that being the older of the two names].
          - 22. Ovary 1, the style sometimes divided.
            - 24. Ovary with 1 ovule and 1 locule; style and stigma 1; fruit hard, dry; corolla absent but mimicked by the calyx and an involucre (definitely one of the more confusing flowers) ..... NYCTAGINACEAE
            - 24. Ovary and fruit not as above; both corolla and calyx present
              - 25. Stamens as many as the corolla lobes and opposite them ..... PRIMULACEAE



- 25. Stamens sometimes as many as the corolla lobes but never opposite them.
- 26. Corolla less than 4 mm, scarious, veinless; fruit a circumscissile capsule ..... PLANTAGINACEAE
- 26. Corolla and fruit not as above.
  - 27. Ovary 4-lobed; fruit of nutlets, usually 4 but 1-3 abort in some species; corolla usually with fornices .....BORAGINACEAE
  - 27. Ovary not 4-lobed; fruit a capsule, berry or drupe.
    - 28. Style with 3 well-developed branches; ovary 3-loculed; capsule with 3 valves..... POLEMONIACEAE
    - 28. Style unbranched or with only 2 branches; fruit not as above.
      - 29. Sepals 5, separate or united only at the base; styles 2 or 1, sometimes divided at the top.
        - 30. Plants twining or trailing; corolla pleated in bud ..... CONVOLVULACEAE
        - 30. Plants erect or diffuse; corolla not pleated in bud.
          - 31. Petals lined with prominent hairs .. MENYANTHACEAE
          - 31. Petals lacking prominent hairs ...HYDROPHYLLACEAE
      - 29. Sepals 4-5, clearly united; style undivided.
        - 32. Ovary with 1 locule ..... GENTIANACEAE
        - 32. Ovary with 2 or more locules.
          - 33. Stamens 5.....SOLANACEAE
          - 33. Stamens 2 or 4.
            - 34. Stamens 2 ..... OLEACEAE
            - 34. Stamens 4 ..... BUDDLEJACEAE

## Group 6

Plants with separate petals and separate sepals that are attached, with the stamens, to the top of a hypanthium.

- 1. Stamens many, more than twice as many as the petals.
  - 2. Leaves usually alternate, usually with stipules; corolla usually 5-merous; pistils 1-many..... ROSACEAE
  - 2. Leaves opposite or whorled, without stipules; corolla 4- or 5-merous; pistil 1
    - 3. Stamens attached well down in the hypanthium; corolla usually 5-merous, petals often wrinkled in bud; plants herbaceous or woody.....LYTHRACEAE
    - 3. Stamens attached at the summit of the hypanthium; corolla often 4-merous, petals not wrinkled in bud; plants woody .....HYDRANGEACEAE
- 1. Stamens up to twice as many as the petals, usually 10 or fewer.
  - 4. Corolla bilaterally symmetric; ovary with 1 locule; fruit usually a legume<sup>37</sup>; all or most stamens often united by their filaments..... FABACEAE
  - 4. Corolla radially symmetric; ovary with 1–4 locules; fruit a capsule or berry; stamens not united by their filaments.
    - 5. Plants herbaceous.
      - 6. Styles 2; ovary often 2-parted near the top ..... SAXIFRAGACEAE
      - 6. Style 1, sometimes branched or lobed distally; ovary never parted distally.
        - 7. Ovary completely inferior, with 4 locules; petals 2 or 4; styles often with 4 branches; stamens 8 .....ONAGRACEAE
        - 7. Ovary superior, with 2–4(occasionally 6) locules; styles unbranched; petals usually 6; stamens 6 or 12 (occasionally 4) .....LYTHRACEAE

<sup>37</sup> **Legume:** dry fruit that splits down both sides. Pea pods are legumes.

- 5. Plants woody.
  - 8. Leaves opposite or whorled; stamens 10 ..... HYDRANGEACEAE
  - 8. Leaves usually alternate; stamens 5, 8, or 10.
    - 9. Petals 4; stamens 8; ovary with 4 locules..... ONAGRACEAE
    - 9. Petals usually 5; stamens usually 5 or 10; ovary with 2 locules; fruit a fleshy berry .....GROSSULARIACEAE

## Group 7

Flowers without a hypanthium; petals separate; stamens more than twice as many as the petals.

Members of the *Fabaceae* do have a hypanthium, but this is often overlooked so they are keyed here as not having one. There are a few of the families in Group 6 that are also keyed out in this group because their hypanthium is often overlooked.

- 1. Ovary inferior.
  - 2. Flowers bisexual; stems usually rough-hairy (with interesting hairs yet); fruit dry, but not winged..... LOASACEAE
  - 2. Flowers unisexual; stems smooth and glabrous; fruit and 3-winged.....BEGONIACEAE
- 1. Ovary superior.
  - 3. Plants trees or shrubs, woody.
    - 4. Flower parts spirally arranged .....MAGNOLIACEAE
    - 4. Flower parts whorled.
      - 5. Filaments united into a tube around the pistil .....MALVACEAE
      - 5. Filaments separate or in clusters.
        - 6. Leaf blades 3–15 cm long and almost as wide and with saw-toothed, sometimes doubly toothed, margins..... TILIACEAE
        - 6. Leaves 0.33–1.5 cm long and 0.1–0.4 mm wide and with smooth-edged margins..... CROSSOMATACEAE
  - 3. Plants herbaceous or woody only at the base, not definite shrubs
    - 7. Sepals 2, united into a pointed cap in *Eschscholzia*.
      - 8. Sepals persistent; plants somewhat succulent.....PORTULACACEAE
      - 8. Sepals falling off when the flower opens; plants not succulent ..... PAPAVERACEAE
    - 7. Sepals usually more than 2.
      - 9. Filaments united into a tube around the pistil .....MALVACEAE
      - 9. Filaments separate, not united into a tube.
        - 10. Leaves alternate.
          - 11. Sepals herbaceous, deciduous..... RANUNCULACEAE
          - 11. Sepals thick, persistent ..... PAEONIACEAE
        - 10. Leaves opposite or whorled.
          - 12. Leaves glandular-punctate; style often more than 1 ..... CLUSIACEAE
          - 12. Leaves not glandular punctate; style 1..... CISTACEAE

## Group 8

Plants with separate petals; stamens not more than twice the number of petals

- 1. Pistils more than 1, nearly or completely separate
  - 2. Plants succulent, particularly the leaves.....CRASSULACEAE
  - 2. Plants not succulent..... RANUNCULACEAE
- 1. Pistil 1.
  - 3. Plants climbing by means of tendrils.
    - 4. Fruit fleshy, with a thin skin (a berry); inflorescence a panicle..... VITACEAE
    - 4. Fruit dry or with a thick outer skin; inflorescence sometimes a panicle.
      - 5. Fruit dry, a legume, splitting on both sides at maturity; leaves usually compound .....FABACEAE

- 5. Fruit fleshy inside but with a tough skin (a pepo), not splitting at maturity; leaves usually simple.....CUCURBITACEAE
- 3. Plants not climbing by means of tendrils
- 6. Styles 2-5, separate to near the top of the ovary.
  - 7. Plants definitely woody, trees or shrubs.
    - 8. Leaves small, scalelike, tightly pressed to the branches; flowers minute, in large clusters .....TAMARICACEAE
    - 8. Leaves well-developed, with petioles and not tightly pressed to the branches.
      - 9. Leaves opposite; fruit dry, with 2 wings ..... ACERACEAE
      - 9. Leaves alternate; fruit fleshy, with one side [this family includes poison ivy; be careful if there are 3 leaflets] .....ANACARDIACEAE
  - 7. Plants herbaceous.
    - 10. Plants aquatic or on wet mud flats.
      - 11. Leaves more or less finely dissected ..... HALORAGACEAE
      - 11. Leaves entire, opposite .....ELATINACEAE
    - 10. Plants terrestrial.
      - 12. Ovary inferior.
        - 13. Fruit dry, splitting into 2 at maturity; ovary with 2 locules..... APIACEAE
        - 13. Fruit a fleshy berry; ovary with locules .....ARALIACEAE
      - 12. Ovary superior.
        - 14. Leaves compound with 3 leaflets.....OXALIDACEAE
        - 14. Leaves simple.
          - 15. Sepals 2; leaves basal or cauline .....PORTULACACEAE
          - 15. Sepals 3-5; leaves mostly cauline.
            - 16. Ovary with 1 locule; leaves always opposite ..... CARYOPHYLLACEAE
            - 16. Ovary with 2-5 locules; leaves alternate or opposite ..... LINACEAE
  - 6. Style 1, often dividing into well-defined branches at the top.
    - 17. Ovary inferior .....CORNACEAE
    - 17. Ovary superior, sometimes appearing inferior because closely surrounded by the hypanthium.
      - 18. Plants woody, trees or shrubs.
        - 19. Corolla bilaterally symmetric, the petals dissimilar.
          - 20. Petals 3..... POLYGALACEAE
          - 20. Petals 4-5.
            - 21. Ovary 1-loculed.....FABACEAE
            - 22. Uppermost petal external to the others, often enfolding them in bud and usually the largest; lowest two petals connate around the pistil, forming the keel ..... FABACEAE
            - 22. Uppermost petal internal to the others and often smaller than them; lowest two petals not connate around the pistil..... CAESALPINACEAE  
[The above two families are now being put back together again. The combined families are called either *Fabaceae* or *Leguminosae*; both names are equally correct]
        - 21. Ovary 3–5-loculed.
          - 23. Leaves pinnately compound .....SAPINDACEAE
          - 23. Leaves palmately compound .....HIPPOCASTANACEAE
  - 19. Flowers radially symmetric, the petals all alike in size and shape.
    - 24. Leaves compound.
      - 25. Fruit winged.
        - 26. Wing terminal on the seed-containing portion of the fruit..... OLEACEAE
        - 26. Wing extending above and below the seed-containing portion of the ovary .....SIMAROUBACEAE

- 25. Fruit not winged, a capsule, berry, or legume.
  - 27. Fruit fleshy, not splitting at maturity ..... BERBERIDACEAE
  - 27. Fruit dry, with 1 locule, splitting down both sides at maturity..... CAESALPINACEAE
- 24. Leaves simple, sometimes highly divided but the parts not separately deciduous.
  - 28. Fruit dry, splitting down both sides at maturity, flattened ..... CAESALPINACEAE
  - 28. Fruit fleshy or, if dry, not flat and splitting down both sides at maturity.
    - 29. Plants trees; leaves alternate. palmately lobed; flowers in ball-shaped clusters, unisexual ..... PLATANACEAE
    - 29. Leaves neither large nor palmately lobed.
      - 30. Stamens alternate with the petals..... CELASTRACEAE
      - 30. Stamens opposite the petals
        - 39. Flowers 3-merous; anthers opening by uplifting valves ..... BERBERIDACEAE
        - 39. Flowers 4-5-merous; anthers dehiscing longitudinally..... RHAMNACEAE
- 18. Plants herbaceous.
  - 40. Sepals 2
    - 41. Flowers radially symmetric; plants succulent ..... PORTULACACEAE
    - 41. Flowers bilaterally symmetric; plants not succulent ..... FUMARIACEAE
  - 40. Sepals 3 or more.
    - 42. Flowers bilaterally symmetric.
      - 43. Fruit with 1 locule, splitting down both sides at maturity; upper petal the largest, usually enclosing the others in bud; all or most stamens united by their filaments ..... FABACEAE
      - 43. Fruit with more than 1 locule, splitting, but not down two sides, at maturity; petals and stamens not both as above.
        - 44. Leaves with the petiole attached to the center of the blade..... TROPAEOLACEAE
        - 44. Leaves with petioles attached to the base of the blades.
          - 45. Sepals 5, none extended as a spur; lowest petal spurred; ovary 3-loculed ..... VIOLACEAE
          - 45. Sepals 3, 1 of which one is extended backwards as a spur; petals not spurred; ovary 5- or 1-loculed ..... BALSAMINACEAE
    - 42. Flowers radially symmetric or nearly so.
      - 46. Leaves compound.
        - 47. Leaves opposite, pinnately compound; leaflets 10-16 ..... ZYGOPHYLLACEAE
        - 47. Leaves alternate, palmately or pinnately compound; leaflets 3-7.
          - 48. Petals 5; stamens 10
            - 49. Stamens all similar in length; leaves pinnately compound; ovary 5-chambered, the style elongating conspicuously in fruit..... GERANIACEAE
            - 49. Stamens in 2 or 3 whorls, the whorls of different lengths; leaves palmately compound ..... OXALIDACEAE
          - 48. Petals 4; stamens 6-16
            - 50. Corolla usually bilaterally symmetric; ovary with 1 chamber, often on a short stalk ..... CAPPARACEAE

- 50. Corolla usually radially symmetric; ovary with two chambers, usually sessile, sometimes on a short stalk ..... [BRASSICACEAE](#)
- 46. Leaves simple, entire to deeply divided.
  - 51. Sepals 4; stamens 6..... BRASSICACEAE
  - 51. Sepals usually 5, sometimes 3, the filaments sometimes united at the base.
    - 52. Fruits splitting open, but not into 2 or more units, at maturity, containing many seeds .....PYROLACEAE
    - 52. Fruits splitting into 3–5 individual units at maturity, each unit containing 1-seed
      - 53. Ovary 3-loculed; the style coming from the base of the ovary .....LIMNANTHACEAE
      - 53. Ovary 5-loculed; the style developing from the top of the ovary .....GERANIACEAE

Monocot Families

Plants usually herbaceous; stems with scattered vascular bundles; primary veins of the leaves usually parallel; flowers 3 -merous; pollen monosulcate or monosulcate derived.

Unlike the Dicots, the monocots appear to form a monophyletic group. Many of the characteristics used to recognize Monocots (see above) are also found in the older dicot families. If in doubt, look for at least two of the above characteristics before deciding that your plant is a monocot.

- 1. Plants green disks 1–5 mm in diameter, without stems, leaves, and flowers, floating on surface of the water or stranded on mud .....LEMNACEAE
- 1. Plants with stems and leaves, rooted in soil or floating in water with the bulk of the plant below the surface of the water.
  - 2. Perianth well-developed, at least the inner segments petaloid in color and texture.
    - 3. Pistils several, the ovaries forming a ring, each ovary with 1 ovule, maturing into a ring of achenes ..... ALISMATACEAE
    - 3. Pistil 1; fruit a capsule or berry.
      - 4. Leaves stiff, linear linear-lanceolate to linear and sharply pointed, mostly basal .. AGAVACEAE
      - 4. Leaves usually flexible, of varying shapes, not sharply pointed, basal or not.
        - 5. Ovary superior.
          - 6. Sepals green; petals colored; inflorescence subtended by 2 leaf-like bracts ..... COMMELINACEAE
          - 6. Sepals and petals usually similar in color; inflorescence not subtended by 2 leaf-like bracts..... .LILIACEAE
    - 5. Ovary inferior.
      - 7. Plants aquatic, the leaves mostly submerged ..... HYDROCHARITACEAE
      - 7. Plants terrestrial; the leaves not submerged.
        - 8. Flowers radially symmetric or nearly so.
          - 9. Stamens 3 ..... IRIDACEAE
          - 9. Stamens 6. .... AMARYLLIDACEAE
        - 8. Flowers bilaterally symmetric.
          - 10. Stamens attached to the style ..... ORCHIDACEAE
          - 10. Stamens attached to filaments .....CANNACEAE
- 2. Perianth lacking or reduced, its parts often only scales or bristles, never colorful
  - 11. Leaves linear, sheathing at the base; stamens and pistils partly or completely concealed by bracts.
    - 12. Leaves usually 2-ranked; stamens and pistil between a pair of dissimilar bracts.....POACEAE

- 12. Leaves 3-ranked or reduced to a sheath; stamens and pistil subtended by 1 bract or the pistil completely enclosed in a modified bract, the *perigynium*<sup>38</sup> ..CYPERACEAE
- 11. Leaves not both linear and sheathing; stamens and pistils not concealed by subtending scales
  - 13. Plants and flowers floating or submerged, or the flowers raised slightly above the surface of the water.
    - 14. Flowers bisexual.
      - 15. Tepals 4; stamens 4; plants of fresh water ..... POTAMOGETONACEAE
      - 15. Tepals lacking; stamens 2; plants chiefly of brackish or alkaline ..... RUPPIACEAE
    - 14. Flowers unisexual.
      - 16. Flowers in globose heads, the lower heads pistillate, the upper heads staminate ..... SPARGANIACEAE
      - 16. Flowers not in globose heads.
        - 17. Pistils solitary, with 2-4 elongate style branches .....NAJADACEAE
        - 17. Pistils usually 3-4, each with a short or elongate style .. ZANNICHELLIACEAE
  - 13. Plants of land or shallow water; leaves and flowers usually well above the surface of the water.
    - 18. Flowers in a dense, elongate spike.
      - 19. Plants 10-40 cm tall; staminate and pistillate flowers intermingled or flowers bisexual .....JUNCAGINACEAE
      - 19. Plants 100-200 cm tall; pistillate flowers in lower portion of spike, staminate flowers in upper portion ..... TYPHACEAE
    - 18. Flowers in racemes, open panicles, or ball-shaped clusters.
      - 20. Flowers unisexual, in ball-shaped clusters, the clusters of pistillate flowers below the clusters of staminate flowers ..... SPARGANIACEAE
      - 20. Flowers bisexual or staminate and pistillate flowers intermixed, arranged in racemes, open panicles, or ball-shaped clusters.
        - 21. Flowers in open or ball-shaped clusters; pistil 1 .....JUNCACEAE
        - 21. Flowers in a raceme; pistils 3 or 6, separating at maturity ....JUNCAGINACEAE

---

<sup>38</sup> **Perigynium:** A vase-like bract that completely encircles the pistil, only the styles poking out of the top.

**A**

ACANTHACEAE ..... 8  
 ACERACEAE ..... 5, 6, 11  
 AGAVACEAE ..... 13  
 AIZOACEAE ..... 7  
 ALISMATACEAE ..... 13  
 AMARANTHACEAE ..... 7  
 ANACARDIACEAE ..... 11  
 APIACEAE ..... 11  
 APOCYNACEAE ..... 8  
 ARALIACEAE ..... 11  
 ARISTOLOCHIACEAE ..... 5  
 ASCLEPIADACEAE ..... 4, 8  
 ASTERACEAE ..... 3

**B**

BALSAMINACEAE ..... 12  
 BEGONIACEAE ..... 10  
 BERBERIDACEAE ..... 11, 12  
 BETULACEAE ..... 6  
 BIGNONIACEAE ..... 8  
 BORAGINACEAE ..... 9  
 BRASSICACEAE ..... 5, 13  
 BUDDLEJACEAE ..... 9

**C**

CAESALPINACEAE ..... 11, 12  
 CALLITRICHACEAE ..... 5  
 CAMPANULACEAE ..... 7  
 CANNABINACEAE ..... 7  
 CANNACEAE ..... 13  
 CAPPARACEAE ..... 12  
 CAPRIFOLIACEAE ..... 8  
 CARYOPHYLLACEAE ..... 7, 11  
 CELASTRACEAE ..... 12  
 CERATOPHYLLACEAE ..... 4  
 CHENOPODIACEAE ..... 6, 7  
 CISTACEAE ..... 10  
 CLUSIACEAE ..... 10  
 COMMELINACEAE ..... 13  
 CONVULVULACEAE ..... 9  
 CORNACEAE ..... 11  
 CRASSULACEAE ..... 5, 8, 10  
 CROSSOMATACEAE ..... 10  
 CUCURBITACEAE ..... 7, 10  
 CUSCUTACEAE ..... 4  
 CYPERACEAE ..... 13

**D**

DIPSACACEAE ..... 3, 8

**E**

ELATINACEAE ..... 11  
 ELEAGNACEAE ..... 6  
 ERICACEAE ..... 8  
 EUPHORBIACEAE ..... 3, 7

**F**

FABACEAE ..... 8, 9, 10, 11, 12  
 FAGACEAE ..... 6  
 FUMARIACEAE ..... 8, 12

**G**

GENTIANACEAE ..... 9  
 GERANIACEAE ..... 12, 13  
 GESNERIACEACEAE ..... 8  
 GROSSULARIACEAE ..... 10

**H**

HALORAGACEAE ..... 4, 11  
 HIPPOCASTANACEAE ..... 11  
 HIPPURIDACEAE ..... 5  
 HYDRANGEACEAE ..... 9  
 HYDROCHARITACEAE ..... 13  
 HYDROPHYLLACEAE ..... 9

**I**

IRIDACEAE ..... 13

**J**

JUGLANDACEAE ..... 5  
 JUNCACEAE ..... 14  
 JUNCAGINACEAE ..... 14

**L**

LAMIACEAE ..... 8  
 LEMNACEAE ..... 13  
 LENTIBULARIACEAE ..... 5  
 LILIACEAE ..... 13  
 LIMNANTHACEAE ..... 13  
 LINACEAE ..... 11  
 LOASACEAE ..... 10

LYTHRACEAE.....9

**M**

MAGNOLIACEAE .....10  
**MAGNOLIOPSIDA** .....3  
MALVACEAE .....8, 10  
MENYANTHACEAE .....5, 9  
**Monocots**.....13  
MORACEAE .....6

**N**

NAJADACEAE .....14  
NYCTAGINACEAE .....7, 8  
NYMPHAEACEAE .....5

**O**

OLEACEAE .....5, 6, 9, 11  
ONAGRACEAE.....9, 10  
ORCHIDACEAE.....13  
OROBANCHACEAE.....4  
OXALIDACEAE.....8, 11, 12

**P**

PAEONIACEAE.....10  
PAPAVERACEAE.....10  
PLANTAGINACEAE .....9  
PLATANACEAE .....6, 12  
POACEAE .....13  
POLEMONIACEAE.....9  
POLYGALACEAE.....8, 11  
POLYGONACEAE .....5, 7  
PORTULACACEAE .....10, 11, 12  
POTAMOGETONACEAE.....14  
PRIMULACEAE.....8  
PYROLACEAE .....4, 13

**R**

RANUNCULACEAE.....5, 7, 10

RHAMNACEAE.....6, 12  
ROSACEAE.....6, 7, 9  
RUBIACEAE.....8  
RUPPIACEAE .....14

**S**

SALICACEAE .....6  
SANTALACEAE.....7  
SAPINDACEAE .....11  
SAXIFRAGACEAE.....9  
SCR .....8  
SCROPHULARIACEAE.....5  
SIMAROUBACEAE .....11  
SOLANACEAE .....9  
SPARGANIACEAE.....14

**T**

TAMARICACEAE .....11  
TILIACEAE.....10  
TROPAEOLACEAE.....12  
TYPHACEAE .....14

**U**

ULMACEAE.....6  
URTICACEAE .....7

**V**

VALERIANACEAE .....7  
VERBENACEAE.....8  
VIOLACEAE .....12  
VISCACEAE .....4  
VITACEAE.....10

**Z**

ZANNICHELLIACEAE.....14  
ZYGOPHYLLACEAE.....12