

Monocotyledons, Part 1

Monocots are a major clade of Angiosperms comprising nearly 70,000 species. Monocots evolved from a herbaceous ancestor that may have resembled a herbaceous member of Basal Angiosperm Grade. Most monocots are herbs with atactostelic stems, parallel-veined leaves, leaf bases that encircle and often ensheath the stem, and trimerous flowers. Monocots include some of the world's most ecologically and economically important plants (Tables 1).

We will survey the monocots this semester in three parts due to the large number of monocot taxa we wish to study.

Table 1. FYI: Economically important families from Monocots part 1 (alphabetically by family).

- 1) Araceae is the source of numerous ornamental, tropical house plants. In the tropics, some plants such as *Monstera deliciosa* produce edible fruits, although generally eating member of this family, especially the foliage, should be avoided.
- 2) Alliaceae is the source of garlic, onion, and chives (all from *Allium*) and daffodils (*Narcissus*).
- 3) Iridaceae is the source of irises (*Iris*).
- 4) Liliaceae is the source of lilies (*Lilium* and related genera) and tulips (*Tulipa*).
- 5) Smilacaceae is the source of edible and medicinal sarsaparilla (*Smilax*).

I. Monocots Part 1**A. Families to Know on Sight****1. Alistmataceae (water-plantain family) – p. 128**

Diagnostic Summary: Aquatic or marsh, acaulescent herbs with emergent, petiolate leaves with pinnate or palmate leaf venation; Flower trimerous and 3 or 6 to many free carpels.

Generalized Flora Formula: $Ca^3 Ca^3 A^{3 \text{ or } 6\text{-many}} \underline{G}^{3 \text{ or } 6\text{-many}}$

2. Araceae (aroid or arum family) – p. 119

Diagnostic Summary: Terrestrial, aquatic, or epiphytic herbs, vines or lianas. Terrestrial plants cormose. Some aquatics exist as free-floating, thalloid duckweeds. Epiphytic and vining (tropical) plants with conspicuous adventitious roots. With the exception of duckweeds, leaves are simple (sometimes trifoliate), petiolate, and with pinnate or palmate venation. Flowers minute and solitary in duckweeds, otherwise numerous and aggregated into fleshy spike called a spadix that is subtended or variously enveloped by a conspicuous spathe.

Generalized Flora Formula: $P^{2+2, 3+3, \text{ or } 0} A^{4 \text{ or } 6} \underline{G}^{[3]}$ minute, spathe & spadix, uni- or bisexual

3. Liliaceae (lily family) – p. 149

Diagnostic Summary: Bulbous herbs with parallel-veined leaves; Flowers trimerous with 6 showy tepals, 6 stamens and 3 fused carpels.

Generalized Flora Formula: $P^{3+3} A^{3+3} \underline{G}^{[3]}$ showy tepals

B. Genera to Know (you can write your own key to genera)

1. Alismataceae – p. 128

- 1) *Alisma* (aquatic herbs)
- 2) *Sagittaria* (aquatic herbs)

2. Araceae – p. 119

- 3) *Arisaema* (herbs)
- 4) *Lemna* (free-floating aquatic herbs)
- 5) *Spirodela* (free-floating aquatic herbs)

3. Alliaceae – p. 173

- 6) *Allium* (herbs)

4. Commelinaceae– p. 394

- 7) *Commelina* (herbs)

5. Hemerocallidaceae – p. 172

- 8) *Hemerocallis* (herbs)

6. Iridaceae– p. 169

- 9) *Iris* (herbs)

7. Liliaceae – p. 149

- 10) *Lilium* (herbs)
- 11) *Tulipa* (herbs)

8. Smilacaceae – p. 148

- 12) *Smilax* (woody or herbaceous vines)

C. Weekly Generic Key Construction

After filling in taxon-data sheets for your genera each week, it is good practice to attempt a key to them. Normally, you're on your own with this, but I've provided you with one on the next page: All you have to do is fill in the genus at the appropriate spot.

Key to Monocots Part 1

- 1. Aquatic herbs
 - 2. Plants minute and free-floating
 - 3. Fronds with 1 or 0 roots..... _____
 - 3. Fronds with 7 or more roots _____
 - 2. Plants larger, rooted in a substrate
 - 4. Lvs entire or at most inconspicuously lobed at base, blade largely elliptic _____
 - 4. Lvs conspicuously lobed (at least basally) Blade strongly sagittate or hastate..... _____
- 1. Terrestrial herbs, shrubs, trees or vining plants
 - 5. Plants vining _____
 - 5. Plants not vining
 - 6. Lvs compound..... _____
 - 6. Lvs simple
 - 7. Lvs thin and linear and < 8 mm wide; Plants pungent, bulbous . _____
 - 7. Lvs broader, > 15 mm wide; Plants pungent or non-pungent, bulbous or non-bulbous
 - 8. Lvs all basal, in rosette
 - 9. Rhizomatous herbs w/ strongly equitant lvs. _____
 - 9. Bulbous herbs w/ lvs not at all or only weakly equitant
 - 10. Lvs elliptic to oblanceolate, wider than 3 cm, apex obtuse _____
 - 10. Lvs more or less linear, narrower than 3 cm, apex acute to acuminate..... _____
 - 8. Lvs and plants clearly or apparently cauline
 - 11. Lvs opposite or whorled..... _____
 - 11. Lvs alternate
 - 12. Non-bulbous plants with conspicuous tubular lf-sheath _____
 - 12. Bulbous plants without conspicuous tubular lf-sheath
 - 13. Lvs 2-3(4), fl erect... _____
 - 13. Lvs 4 or more, fls ascending to drooping..... _____

II. Master Key Construction

Each week, you should be thinking about how to incorporate new genera into your growing master key. Below, I've provide a key to this week and last week's genera. Fill in this week's genera at the appropriate place. After this, you'll be on your own.

Key to Basal Angiosperm Grade & Monocots Part 1

- 1. Aquatic herbs
 - 2. Plants minute and free-floating
 - 3. Fronds with 1 or 0 roots _____
 - 3. Fronds with 7 or more roots _____
 - 2. Plants larger, rooted in a substrate
 - 4. Lvs peltate..... *Brasenia*
 - 4. Lvs not peltate
 - 5. Lvs entire or at most inconspicuously lobed at base..... _____
 - 5. Lvs conspicuously lobed (at least basally)
 - 6. Lf apex pointy, blade strongly sagittate or hastate, basal lobes long and pointy..... _____
 - 6. Lf apex rounded, blade not strongly sagittate or hastate, basal lobes not long and pointy
 - 7. Lf blade basal lobes angular; Petals or petaloid organs many..... *Nymphaea*
 - 7. Lf blade basal lobes rounded; Petals or petaloid organs 5-9 *Nuphar*
- 1. Terrestrial herbs, shrubs, trees or vining plants
 - 8. Plants vining _____
 - 8. Plants not vining
 - 9. Herbs
 - 10. Lvs compound..... _____
 - 10. Lvs simple
 - 11. Lvs thin and linear and < 8 mm wide; Plants pungent, bulbous . _____
 - 11. Lvs broader, > 15 mm wide; Plants pungent or non-pungent, bulbous or non-bulbous
 - 12. Lvs parallel-veined
 - 13. Lvs all basal, in rosette
 - 14. Rhizomatous herbs w/ strongly equitant lvs..... _____
 - 14. Bulbous herbs w/ lvs not at all or only weakly equitant

15. Lvs elliptic to oblanceolate, wider than 3 cm, apex obtuse

15. Lvs more or less linear, narrower than 3 cm, apex acute to acuminate.....

13. Lvs and plants clearly or apparently cauline

16. Lvs opposite or whorled.....

16. Lvs alternate

17. Non-bulbous plants with conspicuous tubular lf-sheath

17. Bulbous plants without conspicuous tubular lf-sheath

18. Lvs 2-3(4), fl erect...

18. Lvs 4 or more, fls ascending to drooping.....

12. Lvs palmately or pinnately-veined

19. Lvs opp; Aerial stm typically with a single pair of lvs; Fl of 3 petal-like organs, solitary, situated btw the pair of lvs..... *Asarum*

19. Lvs alt; Aerial stm with > 2 lvs; Fl minute, lacking perianth, in erect spikes..... *Peperomia*

9. Shrubs or trees

20. Stm with stipular scars encircling twig at or near nodes

21. Lvs broadly 4 to 6 lobed..... *Liriodendron*

21. Lvs entire..... *Magnolia*

20. Stm without stipular scars encircling the twig

22. Some lvs 2 or 3 lobed..... *Sassafras*

22. Lvs all entire

23. Lvs > 15 cm long..... *Asimina*

23. Lvs < 15 cm long..... *Lindera*