

**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 Monocots (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) Agavaceae is the source of agave (Agave), the source of sap that leads both to the production of tequila and agave “nectar”, and of numerous ornamental plants.
- 3) Arecaceae is the source of coconuts (*Cocos nucifera*), dates (*Phoenix dactylifera*), and numerous ornamental trees.
- 4) Alliaceae is the source of garlic, onion, and chives (all from *Allium*) and daffodils (*Narcissus*).
- 5) Bromeliaceae is the source of numerous bromeliads of horticultural importance.
- 6) Cyperaceae: The stem pith of *Cyperus papyrus* was the raw material in the production of Egyptian papyrus paper. In fact, our word “paper” comes from “papyrus.”
- 7) Iridaceae is the source of irises (*Iris*).
- 8) Liliaceae is the source of lilies (*Lilium* and related genera) and tulips (*Tulipa*).
- 9) Musaceae is the source of cultivated bananas and plantains from the genus *Musa*.
- 10) Orchidaceae is the source of orchids, which are important ornamentals and, due to due to poaching, are protected under CITES. Fermented capsules of the Vanilla Orchid (*Vanilla planifolia*) are the source of vanilla flavoring.
- 11) Poaceae is the source of civilization's top food plants: wheat (*Triticum* spp.), rice (*Oryza sativa*), maize or corn (*Zea mays*), oats (*Avena*), barley (*Hordeum vulgare*), and sugar cane (*Saccharum officinale*). Numerous other plants provide ground cover (i.e., Kentucky bluegrass, Bermuda grass, etc.) or ornamentals. Bamboos (e.g., of the genus *Bambusa* and others such as *Phyllostachys*) provide construction materials or ornamentals.
- 12) Smilacaceae is the source of edible and medicinal sarsaparilla (*Smilax*).
- 13) Xanthorrhoeaceae is the source of not only one of the more difficult to spell families, but Aloe Vera (from *Aloe vera* and other species such as *Aloe feroxii*) and numerous ornamentals protected under CITES.
- 14) Zingiberaceae (a relative of Musaceae) is the source of ginger (*Zingiber officinale*), cardamom (*Elettaria cardamomum*) and numerous tropical ornamentals.

## I. Monocots Part 1

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### A. Families to Know on Sight

#### 1. Alismataceae (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*