I've Never Seen That Weed Before
Weed Families & Kin ID

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Plants become weeds when they obstruct our plans, or our tidy maps of the world. If you have no such plans or maps, they can appear as innocents, without stigma or blame.

Richard Mabey

How many weeds?

- About 351,000 species of flowering plants
  - over 16000 genera in (about) 620 families
- All are potentially weeds somewhere for someone

Identification

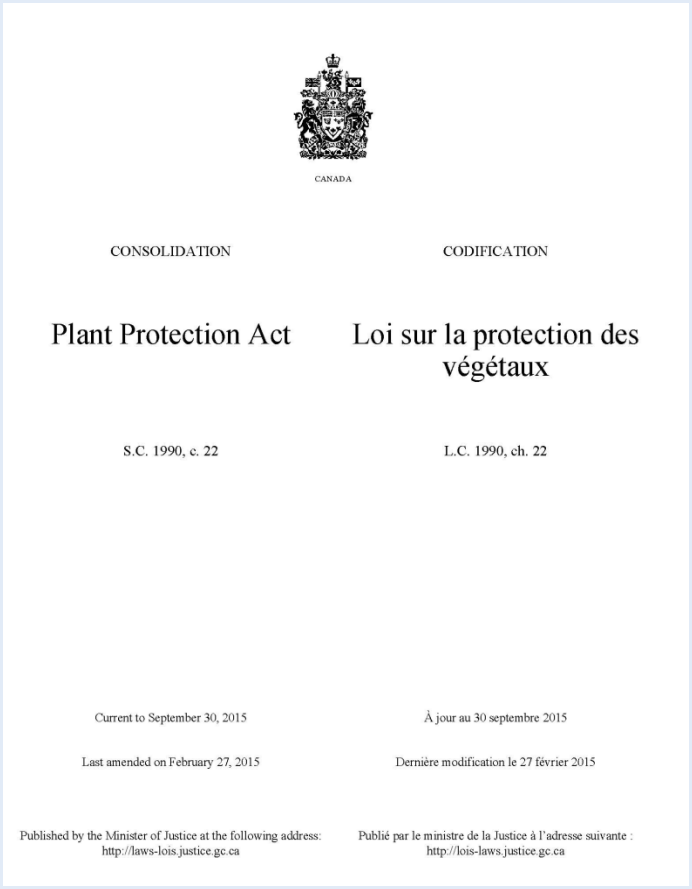
- Hardest job in the world
- Plants in bits, vegetative, seedlings, etc.
- Plants growing under stress
- Herbicide damage

What is the ID worth?

- How important is it?
- What resources are needed?
- Is it urgent?

It might be worth more to someone else.

It’s the LAW !



CANADA

CONSOLIDATION

CODIFICATION

Plant Protection Act

Loi sur la protection des végétaux

S.C. 1990, c. 22

L.C. 1990, ch. 22

Current to September 30, 2015

Last amended on February 27, 2015

À jour au 30 septembre 2015

Dernière modification le 27 février 2015

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http://laws-lois.justice.gc.ca

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http://lois-laws.justice.gc.ca

CONTROL OF PESTS

General

Duty to notify Minister

5. Where a person becomes aware of the existence of a thing that the person suspects to be a pest in an area where the pest has not previously been known to exist, the person shall immediately notify the Minister of the suspected pest and provide the Minister with a specimen of it.

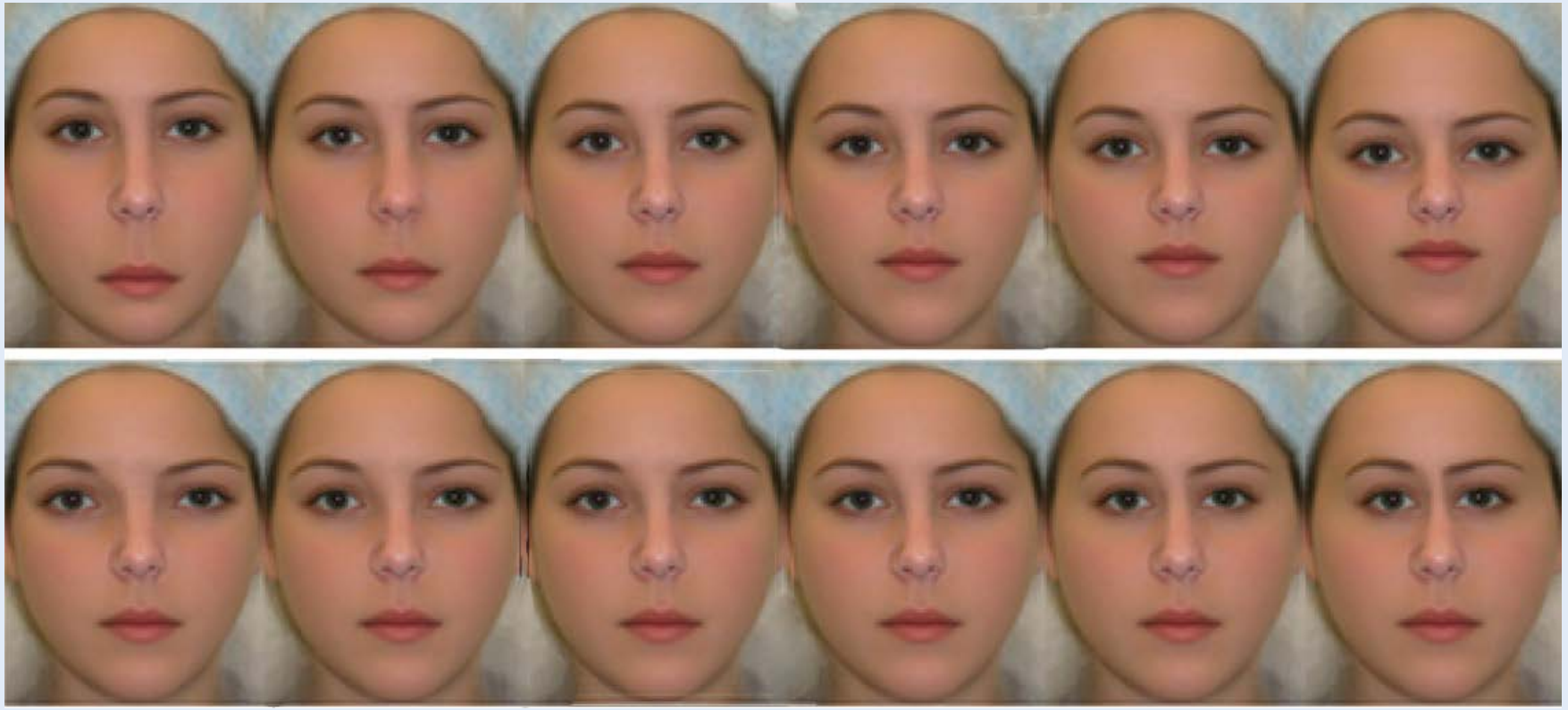
what the ...?

Plant Identification

- recognition
- comparison
- use of keys and similar tools
- expert identification (help!)

Recognition of a familiar troublesome weed

They all look the same to me




Festuca


Carex


Zephyranthes


Schizaea


Juncus


Dipsacus


Eryngium


Scabiosa


Echinops

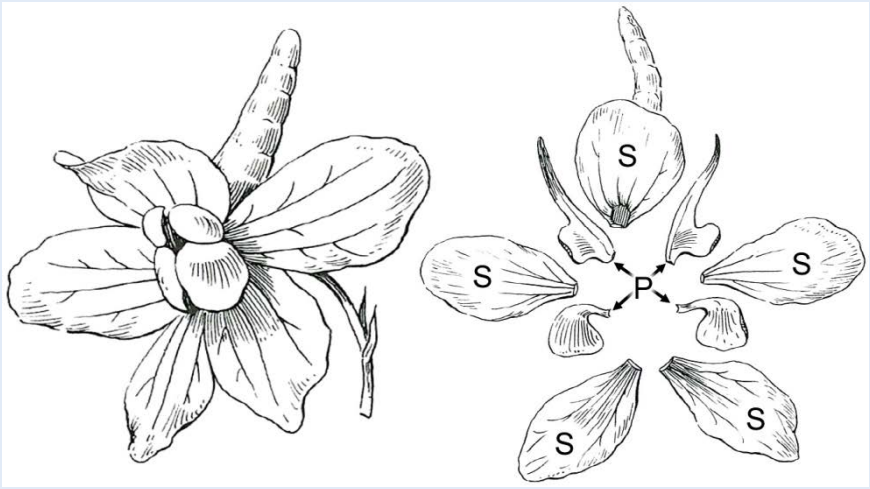

Taraxacum


Leontodum


Hieracium


Crepis

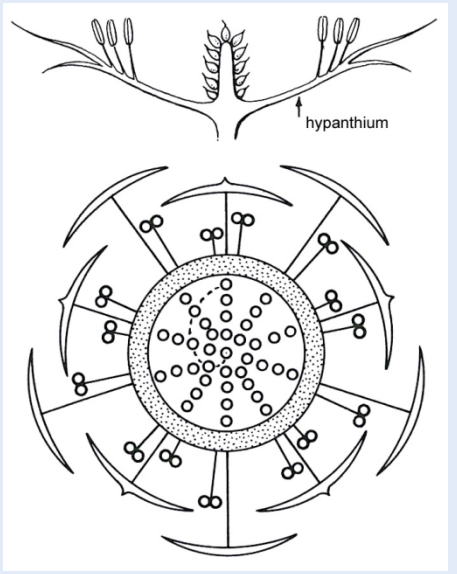
The same only very, very different

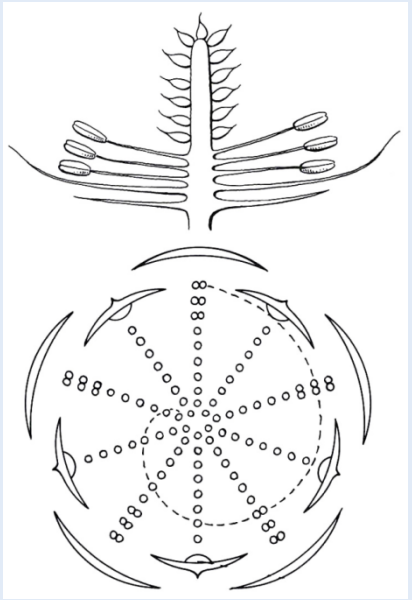


The same only very, very different

Rosaceae

Ranunculaceae





Life cycle changes

Character analysis

Most senses can provide useful information

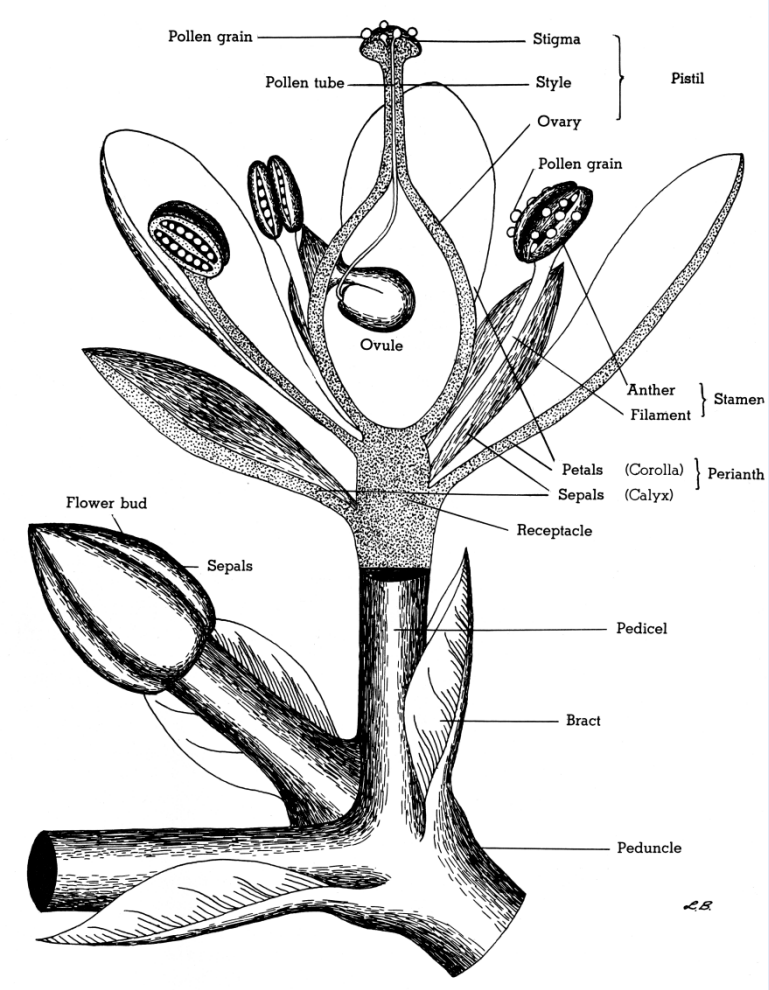
– Sight

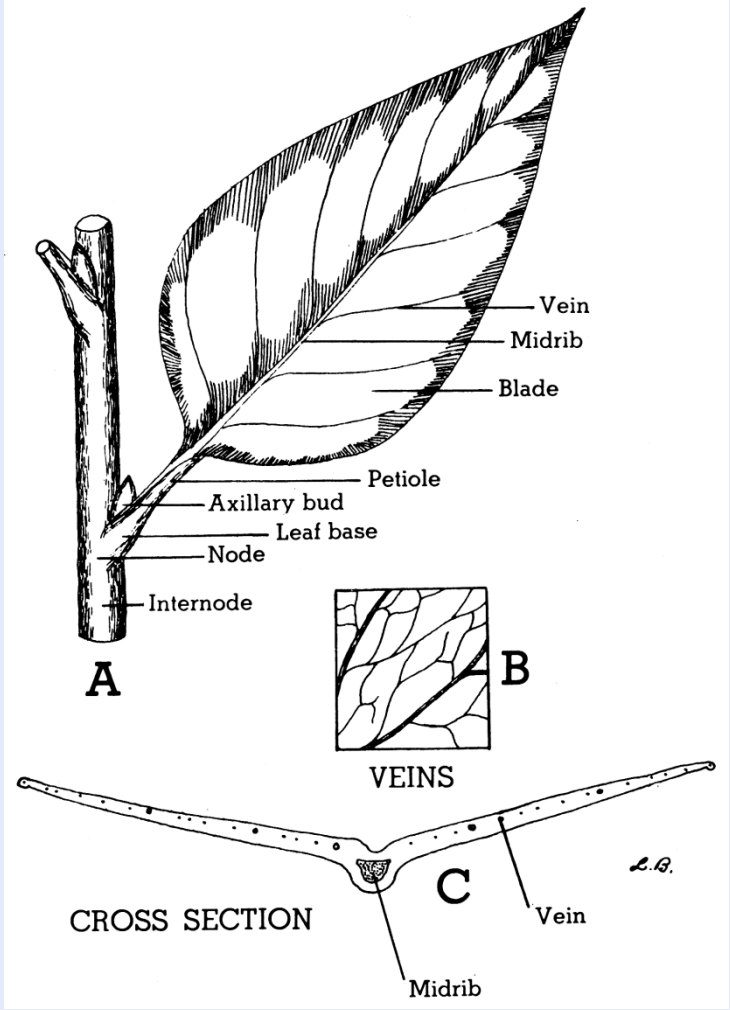
– Touch

– Smell

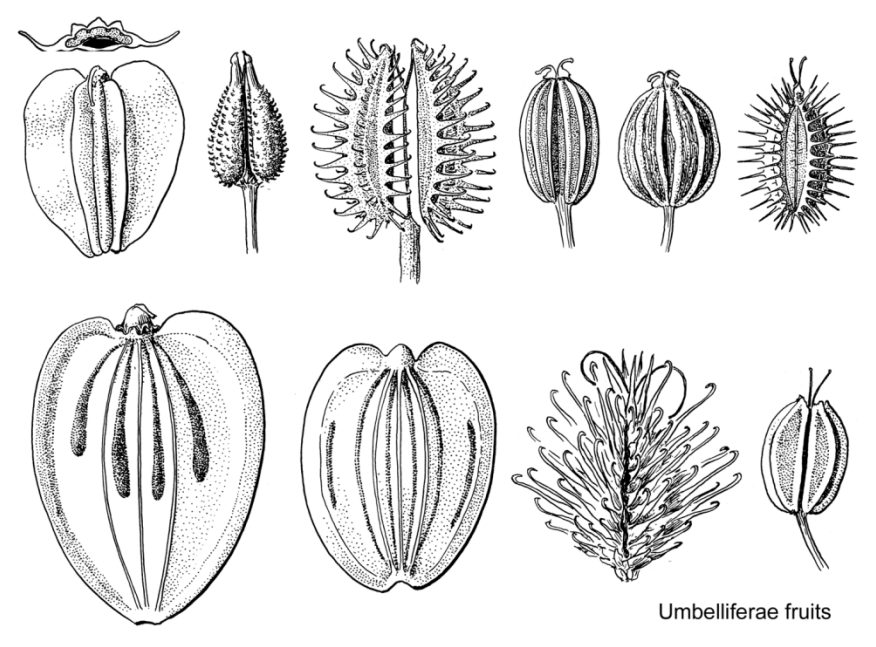
– Taste (be careful)

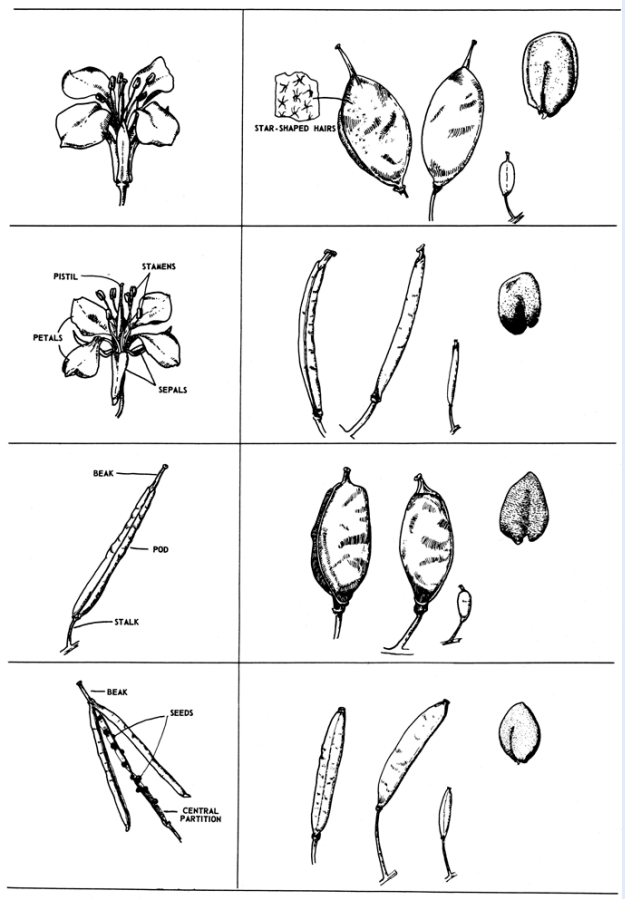
Know your parts





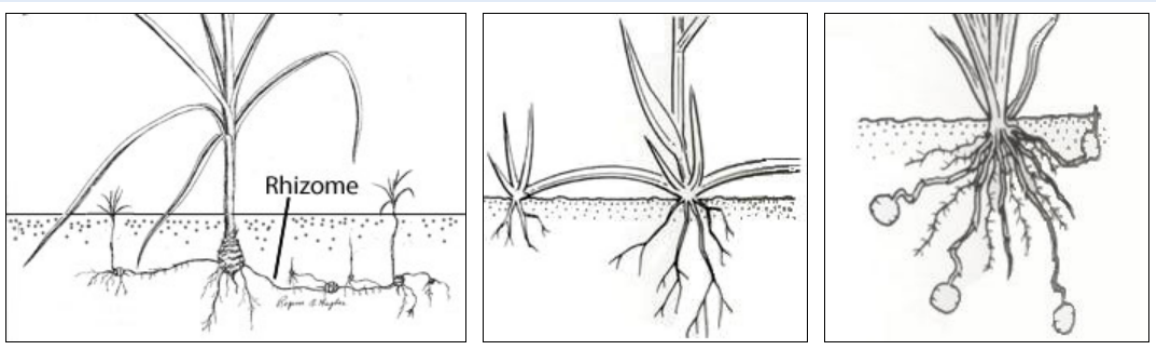
Reproductive parts

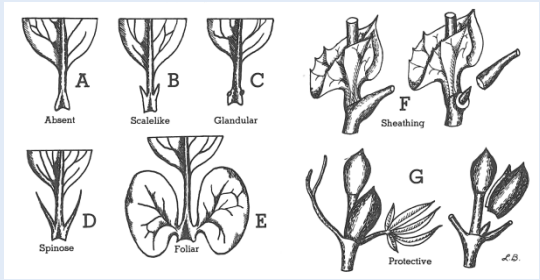


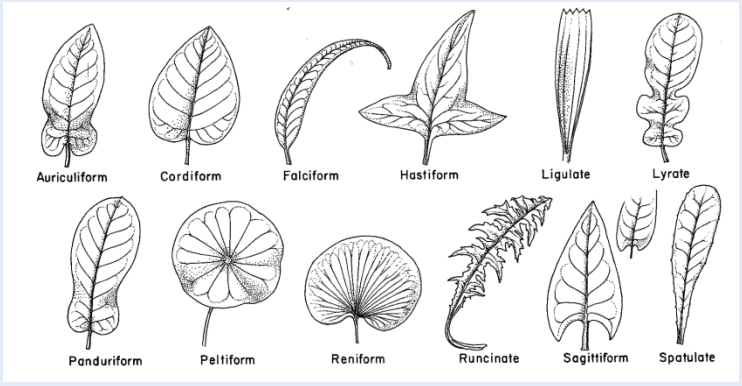


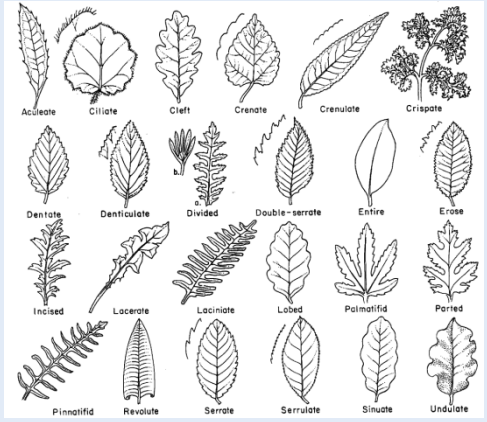
Cruciferae fruits

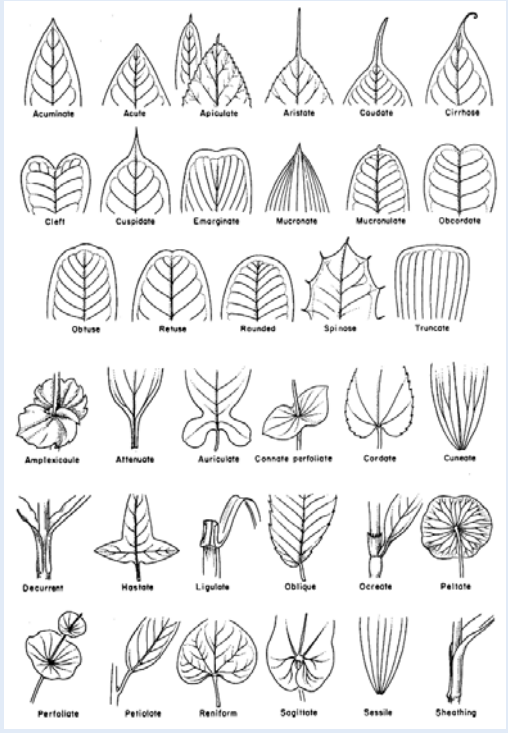
Vegetative parts











Nicandra physalodes

Calyx with 5 overlapping lobes. Ovary with 3-5 cells. Fruit a dry, many-seeded "berry", enclosed by the calyx.

Resources

- Friends or colleagues
- Texts and floras (± technical)
- Herbaria with associated experts (specimens)
- Online (synoptic) keys and other resources (most “apps” are not much help because of the relatively small coverage)
- Diagnostic centres

Many years of experience in the field !

Sending photos ?

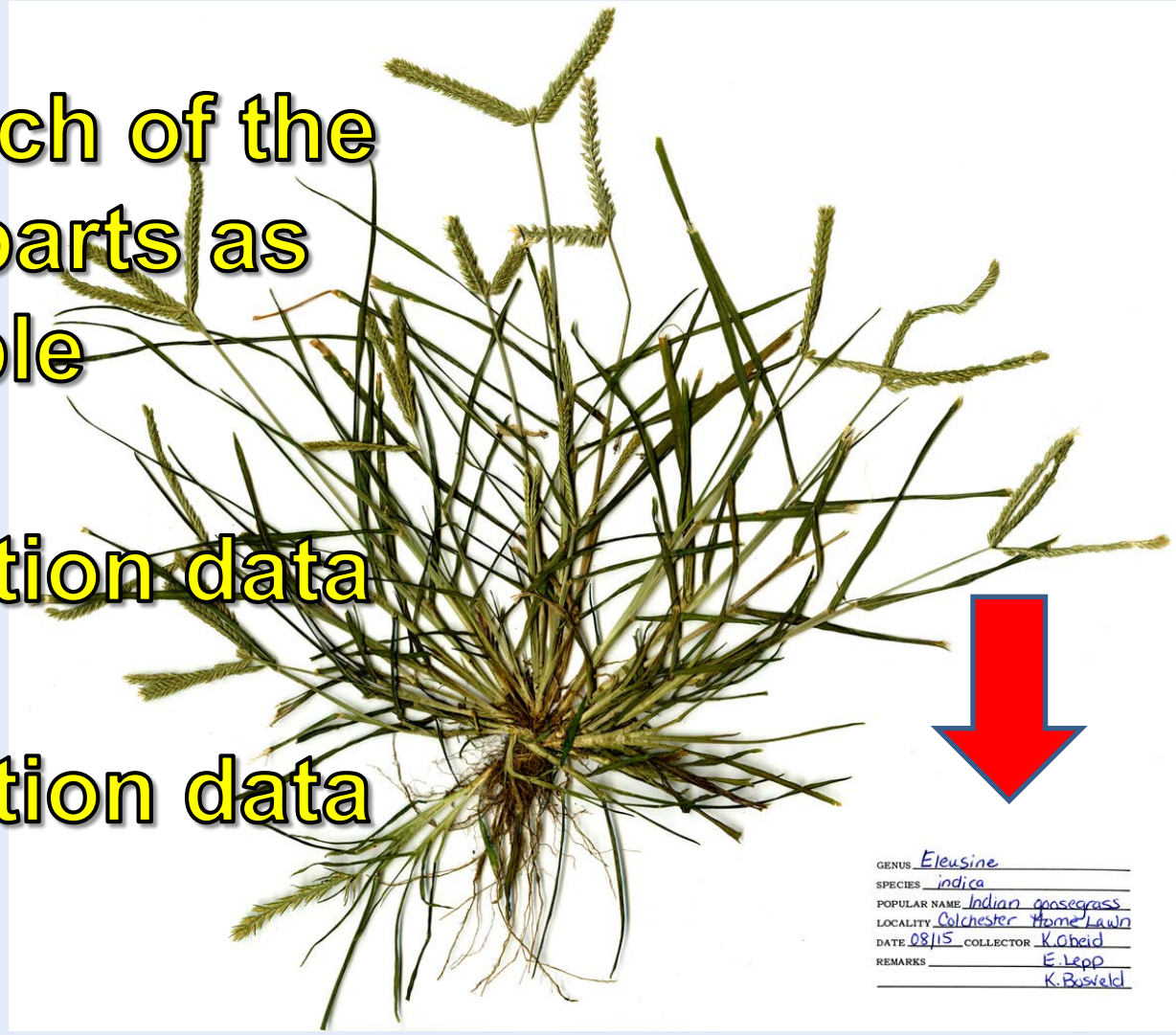
1. Multiple photos

2. Photos in focus

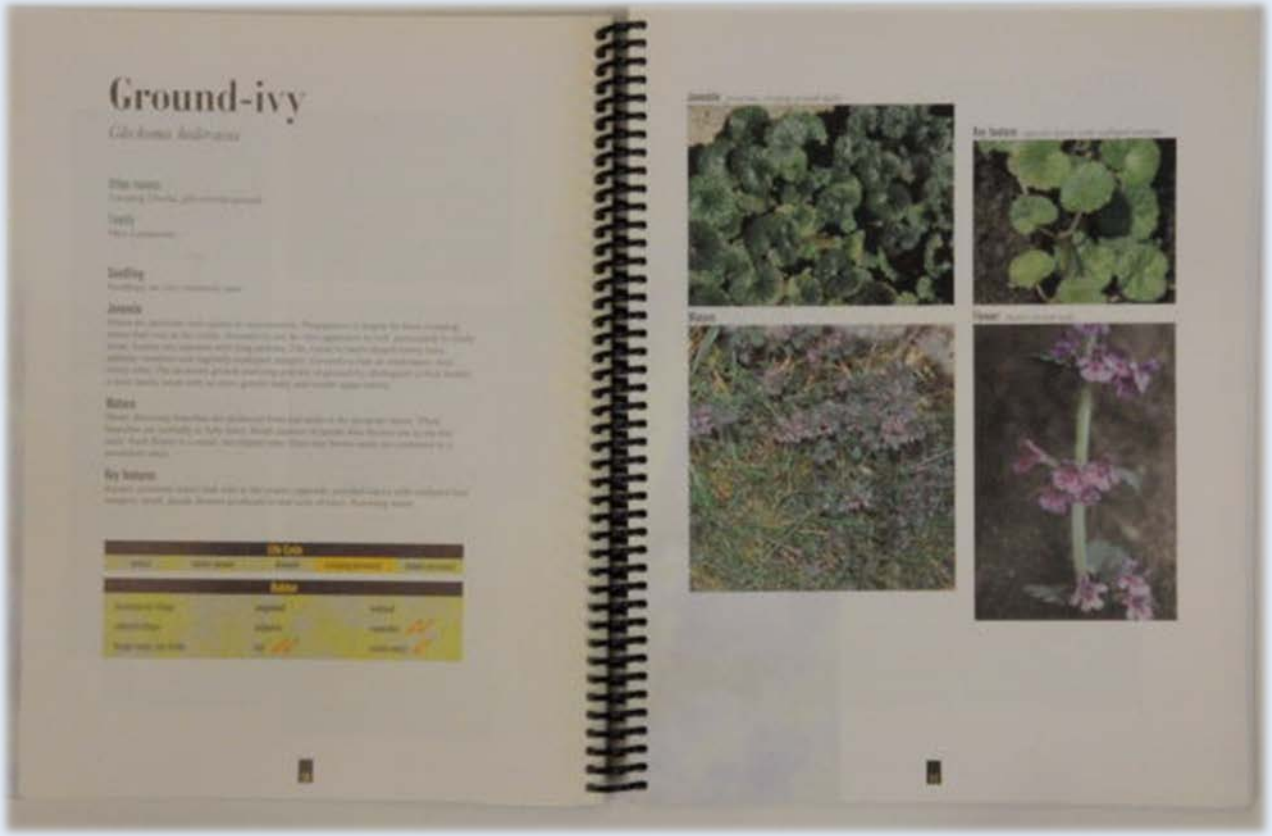
3. Clear indication of scale

Sending specimens ?

1. As much of the plant parts as possible
2. Collection data
3. Collection data



Low Tech



Useful tools

10× is very useful, especially with free hands

Dichotomous (mostly) keys

KEY I
(Herbaceous Dicots with Bisexual Flowers, Perianth in One Series, & Superior Ovary)

1. Ovaries more than 1 in each flower, the carpels separate at least above the middle of the ovaries
   2. Stipules conspicuous; leaves pinnately compound .....**ROSACEAE** (*Poterium*) (p. 832)
   2. Stipules none or leaves simple
      3. Ovaries united for most of lower half; leaves simple, unlobed .....**PENTHORACEAE** (p. 738)
      3. Ovaries distinct; leaves of most species lobed or compound .....**RANUNCULACEAE** (p. 781)
1. Ovary 1 in each flower (bearing 1 or more styles), the carpels united at least below the styles
   4. Leaves bipinnately compound, fruit a legume .....**FABACEAE** (p. 591)
   4. Leaves simple or compound (but not bipinnate); fruit not a legume
      5. Plants with a solitary large (ca. 3–5 cm wide) white flower between a single usually opposite or subopposite pair of long-petioled cauline eccentrically peltate and deeply lobed leaves .....**BERBERIDACEAE** (*Podophyllum*) (p. 461)
      5. Plants with more flowers per stem or, if only one, then leaves not as above
         6. Stamens more than twice as many as the perianth lobes or parts
            7. Leaves tubular, open at apex and hence pitcher-like .....**SARRACENIACEAE** (p. 887)
            7. Leaves flat, of normal structure, simple or compound but not hollow
               8. Perianth small and inconspicuous (stamens more showy); leaves compound with definite flat broad leaflets .....**RANUNCULACEAE** (p. 781)
               8. Perianth well developed, showy; leaves simple or dissected into very narrowly linear segments
                  9. Leaf blades entire, unlobed except for deeply cordate base; plants aquatic .....**NYMPHAEACEAE** (*Nuphar*) (p. 705)
                  9. Leaf blades deeply lobed or dissected; plants terrestrial
                     10. Perianth parts 5; leaves pinnately dissected; sap watery .....**RANUNCULACEAE** (*Nigella*) (p. 791)
                     10. Perianth parts 4 or 8; leaves ternately dissected (with watery sap) or otherwise toothed, spiny-margined, or lobed (with milky or colored sap) .....**PAPAVERACEAE** (p. 730)
         6. Stamens only twice as many as the perianth lobes or parts, or fewer
            11. Style 1 or none (stigmas may be 2 or more)
               12. Stamens more numerous than the perianth divisions
                  13. Flowers bilaterally symmetrical; perianth colorful (white, yellow, or pink) .....**PAPAVERACEAE** (p. 736)
                  13. Flowers regular; perianth dull, greenish
                     14. Leaves opposite; flowers mostly axillary .....**LYTHRACEAE** (*Ammannia*) (p. 687)
                     14. Leaves alternate or basal; flowers mostly terminal .....**BRASSICACEAE** (p. 480)
               12. Stamens the same number as or fewer than the perianth lobes or parts
                  15. Leaves alternate or basal
                     16. Perianth parts (and stamens) 6, 8, or 9 .....**BERBERIDACEAE** (p. 459)

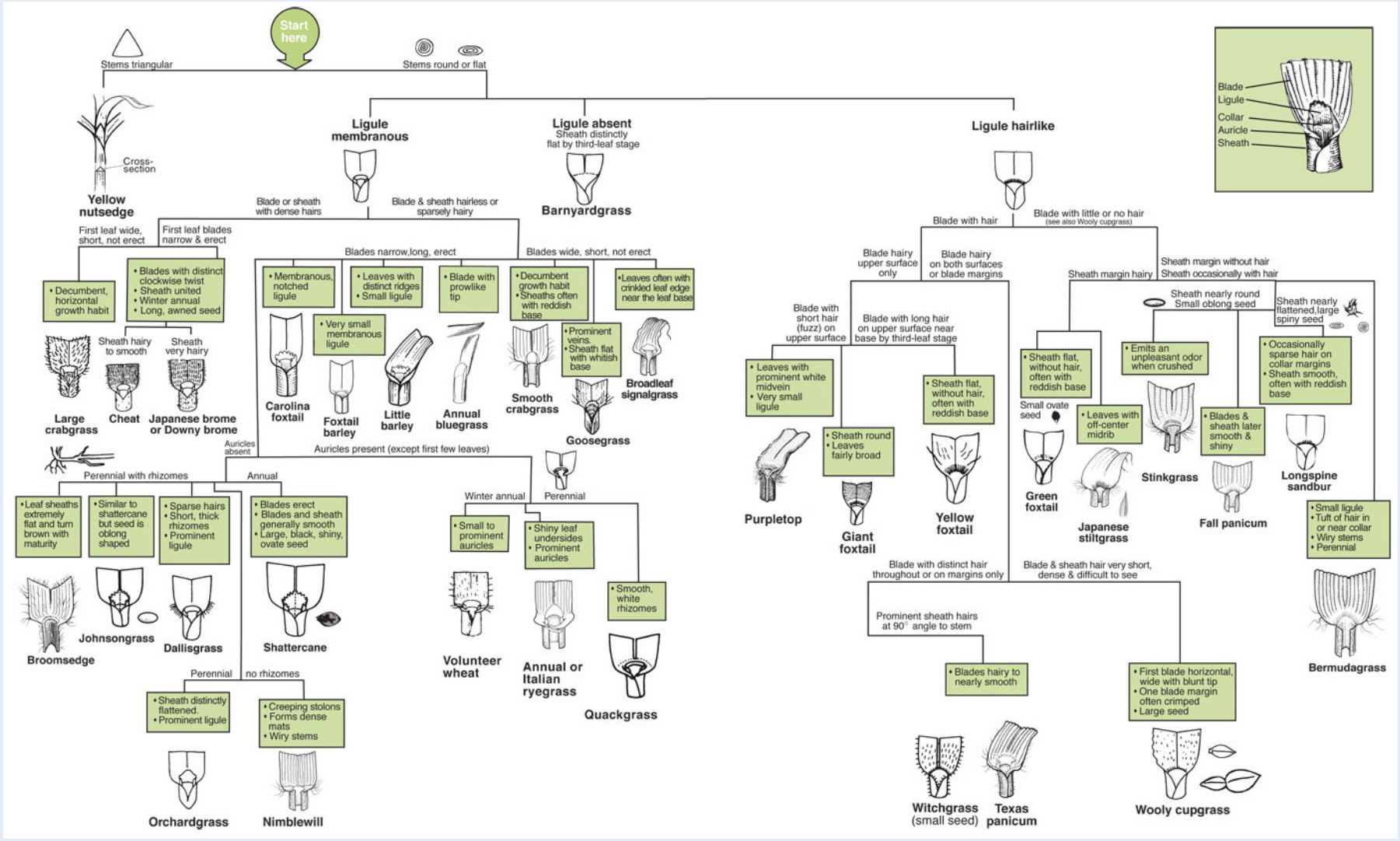
Section 11. Herbaceous Dicotyledons with Perfect Flowers; Calyx and Corolla both Present; Ovaries Two or More in each Flower.

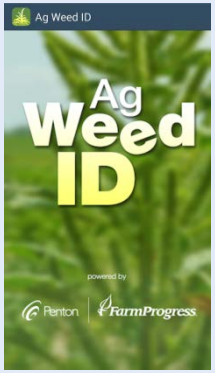
Style one for each flower, often divided above into two or more branches.
- Ovaries 2; corolla gamopetalous; stamens 5. — Apocynaceae, **3**: 69.
- Ovaries 5 or more; leaves alternate; petals separate or barely united at the very base; stamens numerous, monadelphous. — Malvaceae, **2**: 524.
- Ovaries 4; corolla gamopetalous; stamens never monadelphous.
  - Leaves alternate; corolla usually regular; stamens 5. — Boraginaceae, **3**: 109.
  - Leaves opposite; corolla usually irregular; stamens 2 or 4. — Labiatae, **3**: 139.

Styles as many as the ovaries, or in some plants not or scarcely developed at all.
- Flowers irregular.
  - Stamens numerous; leaves compound or deeply divided (*Aconitum, Delphinium*). — Ranunculaceae, **2**: 155.
  - Stamens 5; leaves serrate or lobed (*Heuchera*). — Saxifragaceae, **2**: 267.
- Flowers regular.
  - Sepals and petals each 3.
    - Aquatic plants with entire floating leaves or submersed dissected leaves (*Brasenia, Cabomba*). — Nymphaeaceae, **2**: 147.
    - Land plants with alternate, pinnately divided leaves. — Limnanthaceae, **2**: 494.
    - Mud plants with opposite entire leaves and minute axillary flowers (*Tillaea*). — Crassulaceae, **2**: 259.
  - Sepals 3 (actually bracts, but easily mistaken for sepals); petal-like sepals 5–12; leaves all basal, 3–5-lobed (*Hepatica*). — Ranunculaceae, **2**: 183.
  - Sepals and petals each 4 or more.
    - Petals united for part of their length into a tubular or salverform corolla.
      - Leaves opposite. — Apocynaceae, **3**: 69.
      - Leaves alternate; plants erect; flowers in terminal clusters (*Amsonia*). — Apocynaceae, **3**: 70.
      - Leaves alternate; plants trailing; flowers solitary on axillary peduncles (*Dichondra*). — Convolvulaceae, **3**: 86.
    - Petals separate.
      - Leaves rotund, centrally peltate; flowers solitary, 12–25 cm. wide (*Nelumbo*). — Nymphaeaceae, **2**: 148.
      - Leaves not centrally peltate; flowers of smaller size.
        - Cauline leaves opposite or whorled.
          - Ovaries 2; flowers racemose; petals deeply pinnatifid (*Mitella*). — Saxifragaceae, **2**: 266.
          - Ovaries 3–5; flowers cymose or axillary; petals not pinnatifid (*Sedum, Tillaea*). — Crassulaceae, **2**: 255.
        - Cauline leaves alternate, or leaves all basal.
          - Hypanthium none; sepals separate to the base. — Ranunculaceae, **2**: 155.
          - Hypanthium present, appearing like a calyx-tube, saucer-shaped or cup-shaped, bearing the sepals and petals at its margin.
            - Pistils as many as the petals, or more numerous.
              - Leaves compound or distinctly lobed. — Rosaceae, **2**: 281.
              - Leaves simple, entire or serrate. — Crassulaceae, **2**: 255.
            - Pistils fewer than the petals.
              - Leaves simple or shallowly lobed. — Saxifragaceae, **2**: 260.
              - Leaves 3-foliolate or once-pinnately compound; flowers yellow (*Agrimonia, Waldsteinia*). — Rosaceae, **2**: 281.
              - Leaves ternately decompound; flowers white.
                - Stamens 15 or more; pistils 3–5 (*Aruncus*). — Rosaceae, **2**: 287.
                - Stamens 10; pistils 2 or occasionally 3 (*Astilbe*). — Saxifragaceae, **2**: 260.

38(17). Joints of leaf sheaths and lamina somewhat pilose.....**39.**
\+ Joints of leaf sheaths and lamina somewhat glabrous.....**42.**

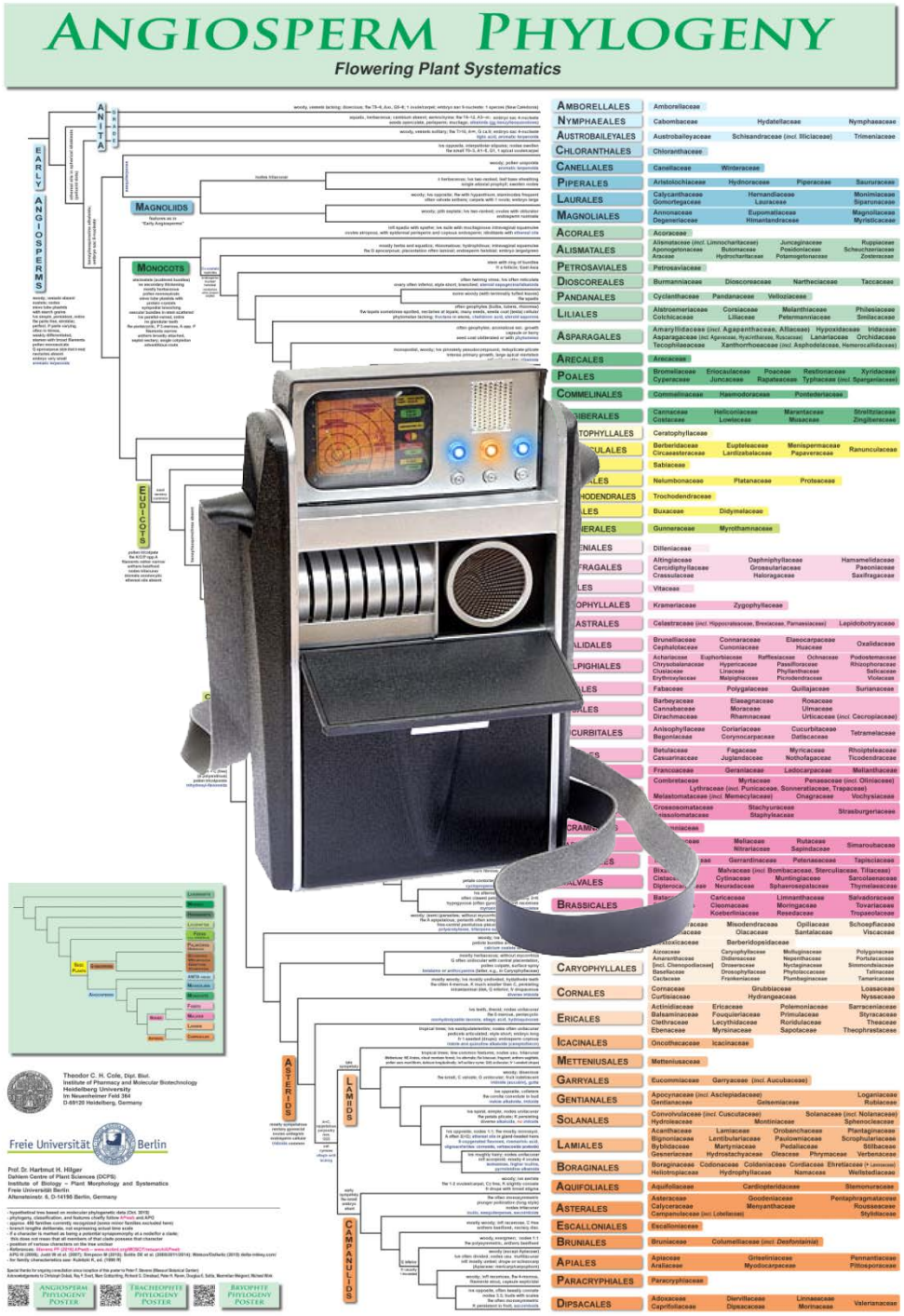
Illustrated key





weedinfo.ca

weedalert.com



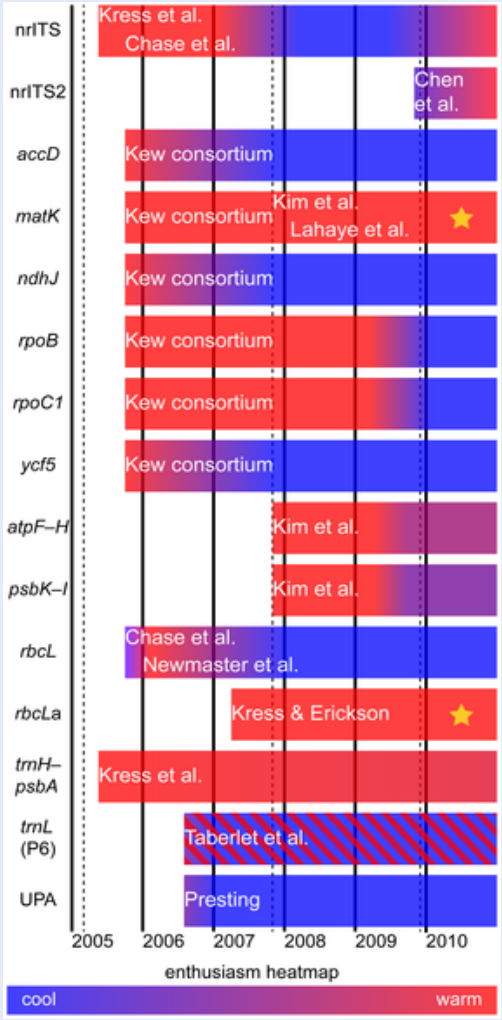
DNA Barcoding?

Animals: cytochrome *c* oxidase 1

Plants:

Marker	Genomic source	Type
nrITS	Nuclear	Transcribed spacers and 5.8S gene
nrITS2	Nuclear	Transcribed spacer
atpF-H	Plastid	Inter-genic spacer
matK	Plastid	Protein coding
psbK-I	Plastid	Inter-genic spacer
rbcL	Plastid	Protein coding
rpoB	Plastid	Protein coding
rpoC1	Plastid	Protein coding
trnH-psbA	Plastid	Inter-genic spacer
trnL-F	Plastid	Intron and inter-genic spacer
***trnL* (P6)**	Plastid	Intron

Schematic timeline of the consideration of different markers as plant barcodes.



One of the biggest challenges in reaching agreement on a plant barcode was a lack of comparative data encompassing all candidate markers and a broad taxonomic sample.

Hollingsworth PM, Graham SW, Little DP (2011) Choosing and Using a Plant DNA Barcode. PLoS ONE 6(5): e19254. doi:10.1371/journal.pone.0019254