



Introduction to Wetland Plant Identification Webinar

Association of State Wetland Managers & EPA
Region 7

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1 June 2017

Tour of Wetlands

Is this Missouri?





Allred Lake Natural Area, SE Missouri
Tupelo-Bald Cypress Swamp
Nyssa aquatica and *Taxodium distichum*

Pin Oak Slough Natural Area, Knob Noster State Park, MO
Pin oak - Button Bush *Quercus palustris* - *Cephalanthus occidentalis*



Saline Seep, Blue Lick Conservation Area, MO *Spartina pectinata* prairie cordgrass





Oxidized Rhizospheres



Saline Valley Conservation Area, Spring and seep



Big Buffalo Creek Fen, Big Buffalo Creek Conservation Area





2013 7 3

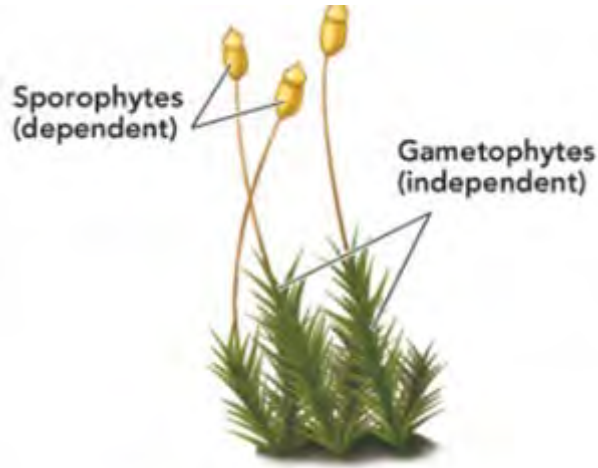


Otter Slough Conservation Area, MO
***Hymenocallis caroliniana* spider lily**

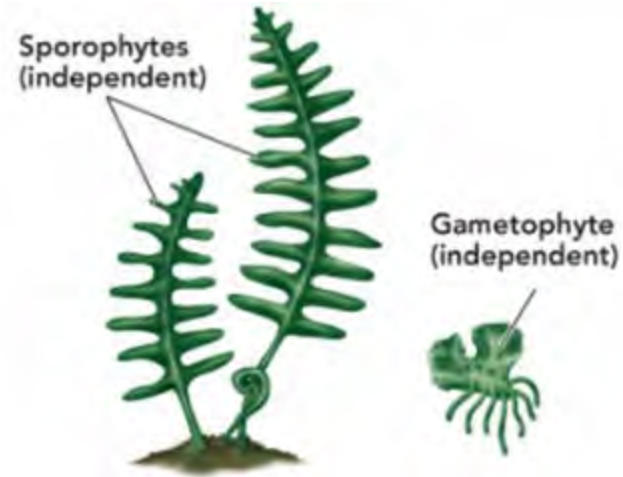
Outline

1. Wetland Tour
2. Plant Habit
3. Plant Organs & Characteristics
 - 1) Roots
 - 2) Stems
 - 3) Leaves
4. Reproductive Organs
 - 1) Cones
 - 2) Flowers
5. Dichotomous Key
 - 1) Major Plant Groups
 - 2) Selected Monocot and Dicot Families

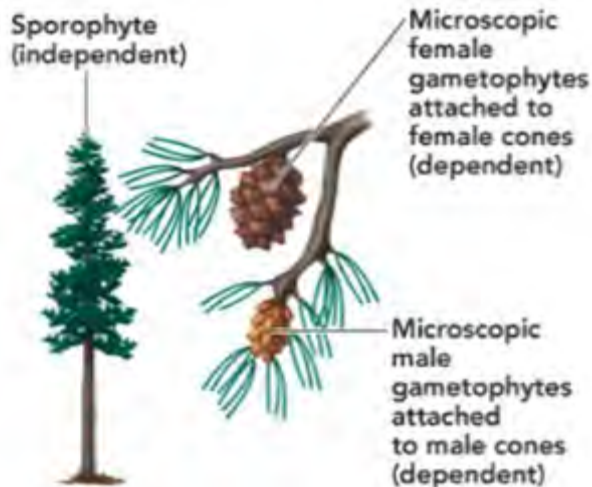
Bryophytes (Mosses,
Liverworts & Hornworts)



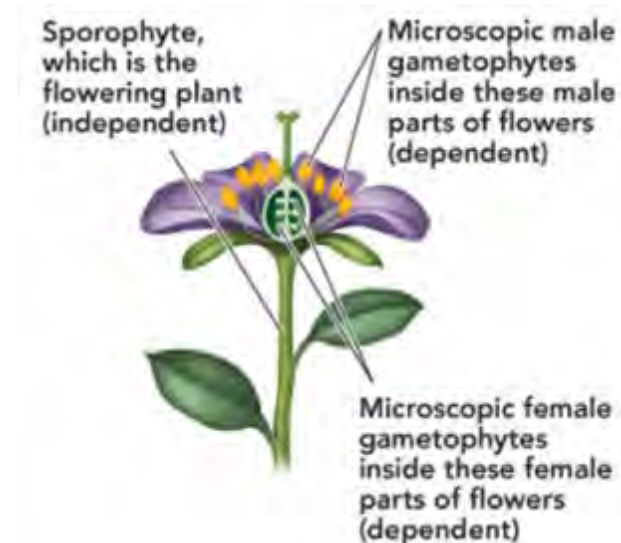
Pteridophytes – Vascular seedless plants
(Ferns, *Equisetum* spp. and *Lycopodium* spp.)



Gymnosperms – Woody cone bearing
plants with naked seeds (Pinaceae,
Cupressaceae)



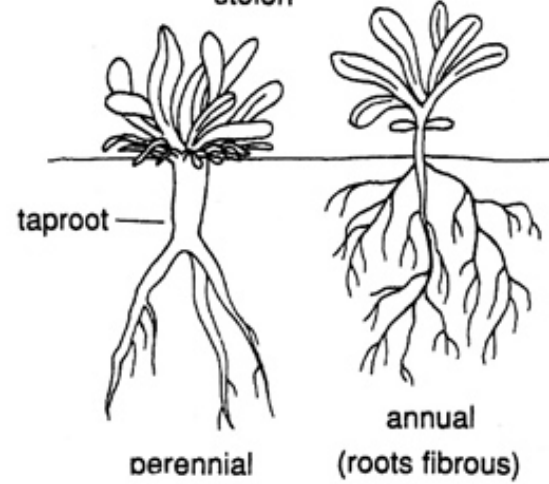
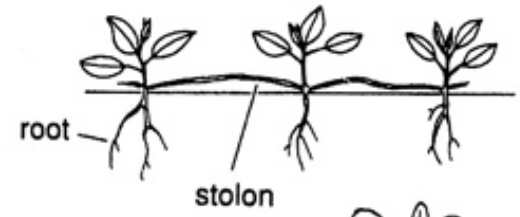
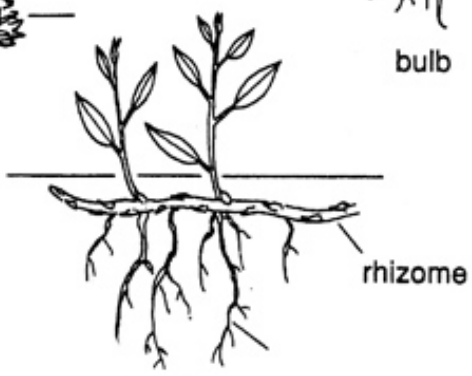
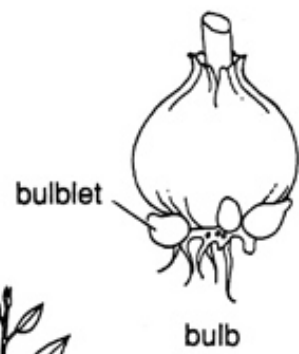
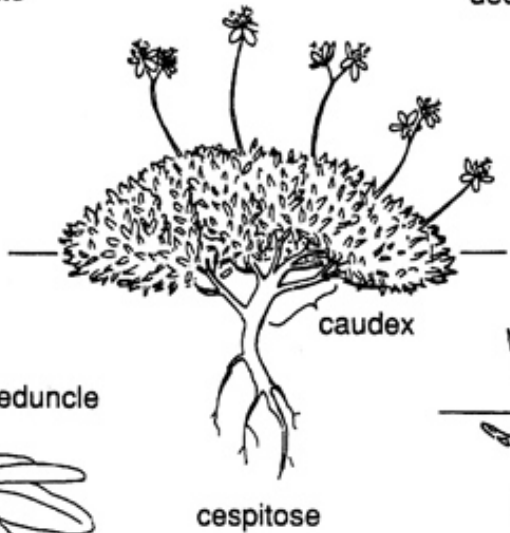
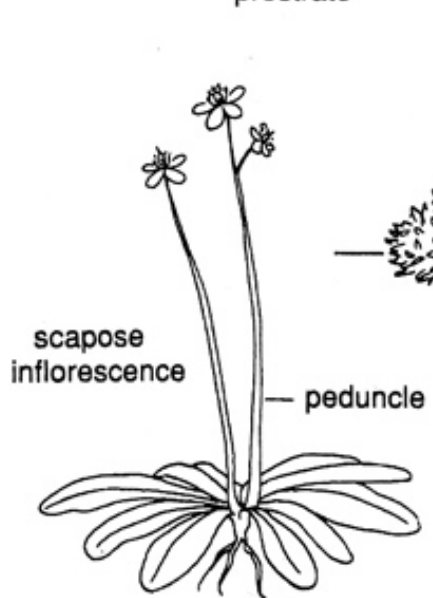
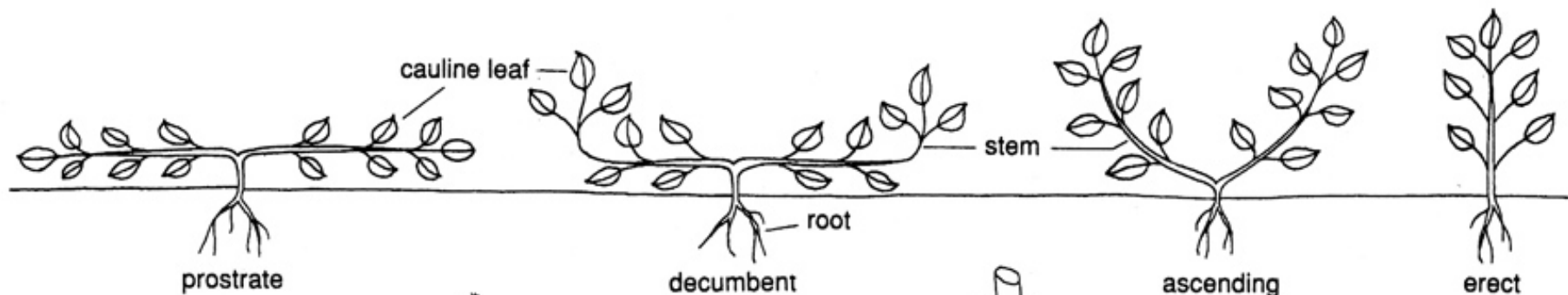
Angiosperms – The flowering Plants
(Monocots and Dicots)



Tools for the Identification of Wetland Plants

- A plant to identify (preferably fresh-not herbarium specimen)
- 10 x hand lens or Stereoscopic (Dissecting) Microscope
- Single edge razor blade and a pair of dissecting needles
- Dichotomous Key (we will use these later on)
- State or regional Flora (often with Dichotomous Keys)

Vegetative & Reproductive
Morphological
Characteristics needed to
Identify Wetland Plants



TREE



SHRUB



ASCENDING

Type of Roots



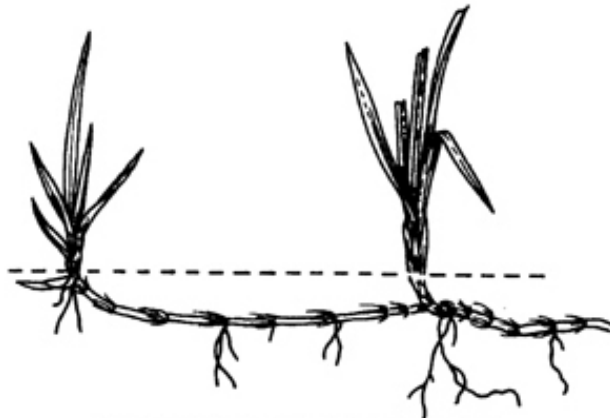
Phalaris arundinacea



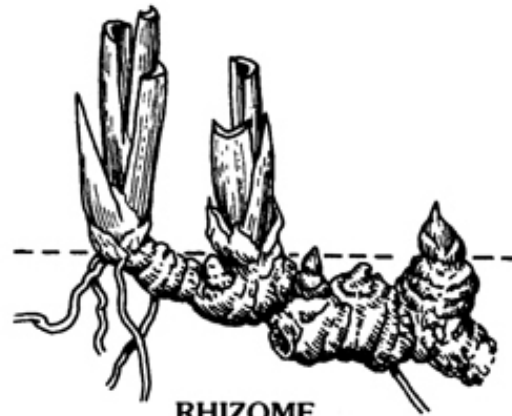
Sagittaria latifolia



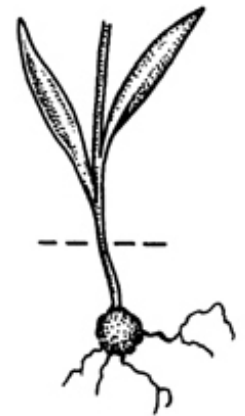
CORM



STOLONIFEROUS RHIZOME



RHIZOME



TUBEROUS



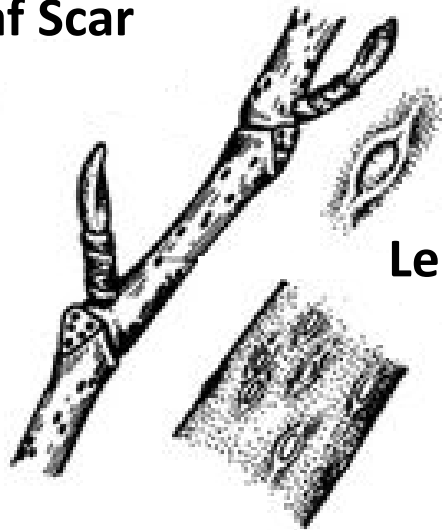
Crocus chrysanthus



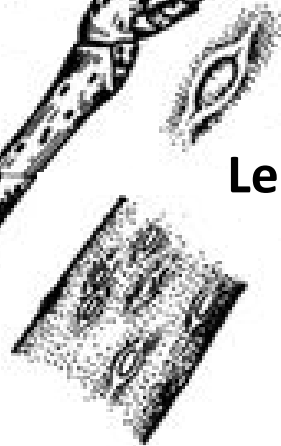
Vascular
Bundle
Scars



Leaf Scar



Lenticel



Terminal Bud

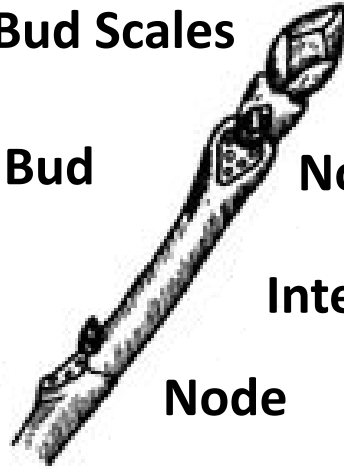
Bud Scales

Lateral Bud

Node

Internode

Node



Chambered



Solid



Diaphragmed



Hollow



Triangulate



Star-shaped



Rounded



Tendrils



Spur Shoots



Thorns



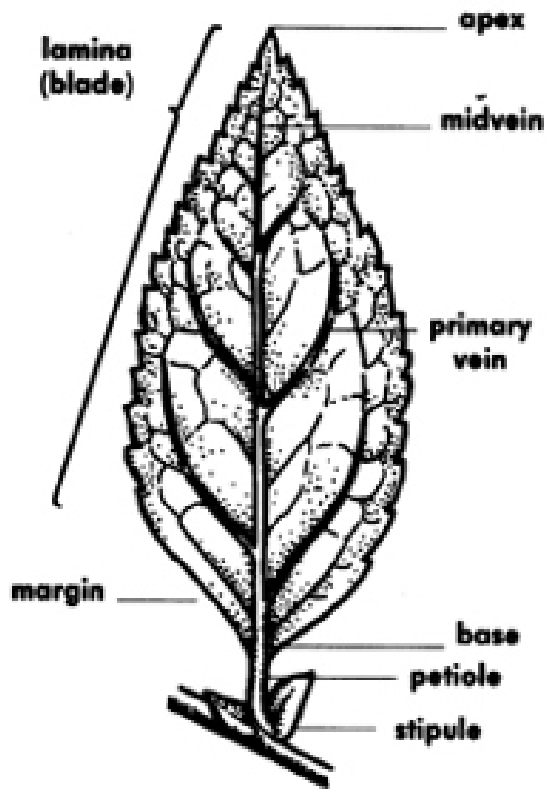
Prickles



Spines



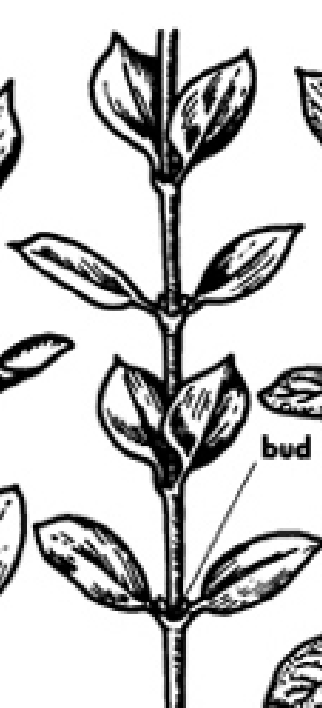
Leaf Morphology and Phyllotaxy (leaf arrangement on Stem)



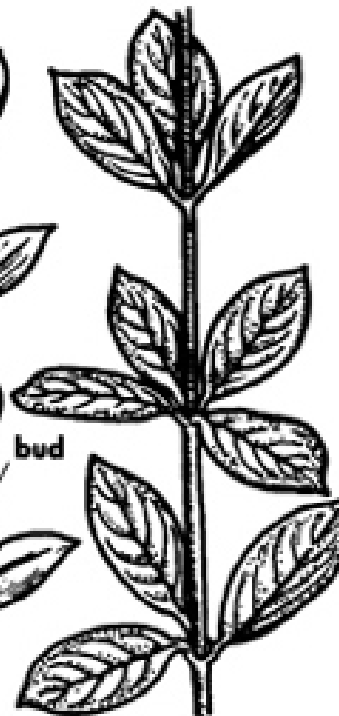
LEAF PARTS



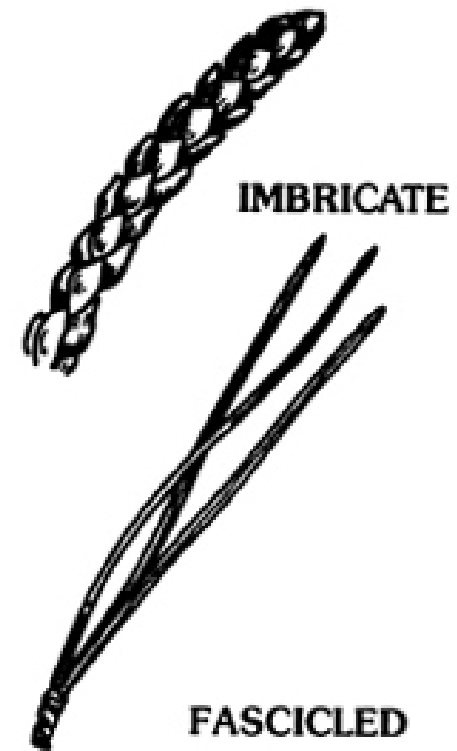
ALTERNATE



OPPOSITE



WHORLED



FASCICLED



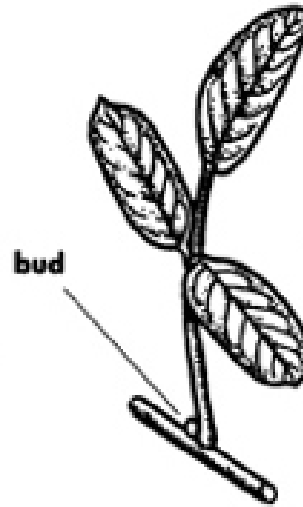
**SIMPLE
(SESSILE)**



**PALMATELY
COMPOUND**



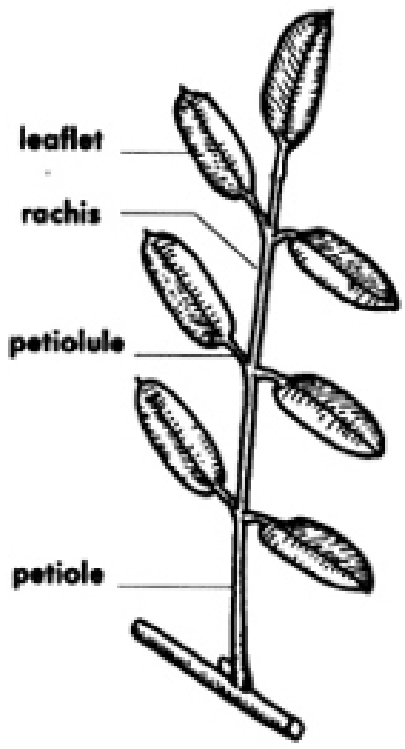
**PALMATELY
TRIFOLIOLATE**



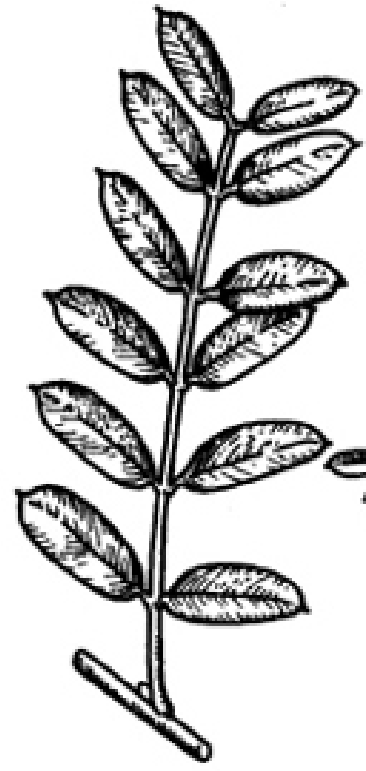
**PINNATELY
TRIFOLIOLATE**



BITERNATE



ODD-PINNATE



EVEN-PINNATE



BIPINNATE



TRIPINNATE

Leaf Shape, Venation, and Margins



ARCUATE



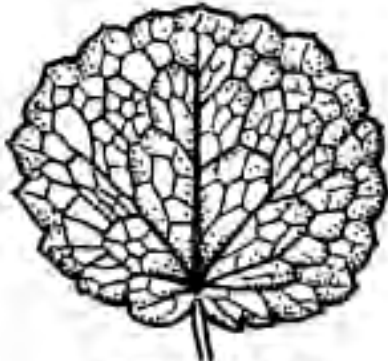
PALMATE



PARALLEL



PINNATE



RETICULATE



INVOLUTE



LACERATE



LACINIATE



LOBED



PINNATIFID



REVOLUTE



SERRATE



DOUBLY SERRATE

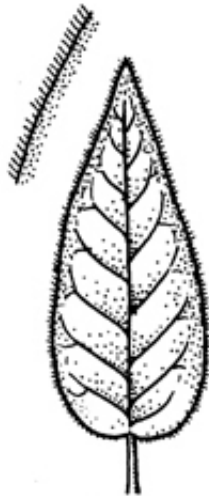


SERRULATE

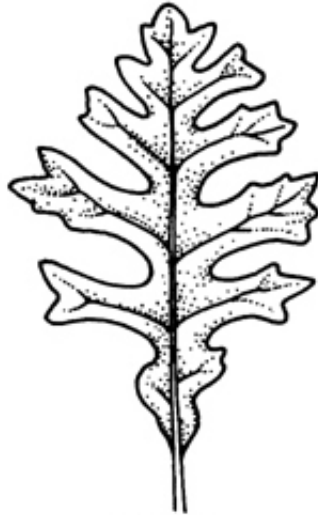


SINUATE

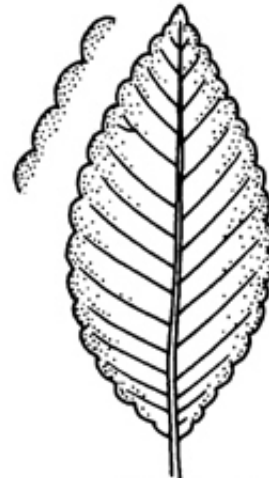
Leaf Shape, and Margins



CILIATE



CLEFT



CRENATE



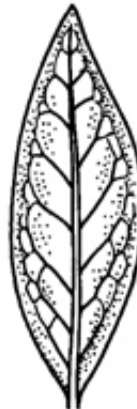
CRENULATE



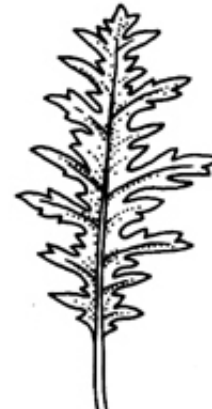
DENTATE



DENTICULATE



ENTIRE



INCISED

Leaf Apices



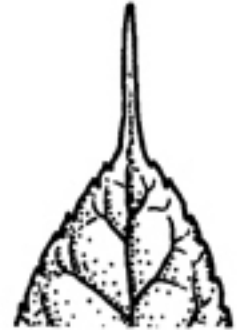
**BROADLY
ACUMINATE** **NARROWLY
ACUMINATE** **ABRUPTLY
ACUMINATE**



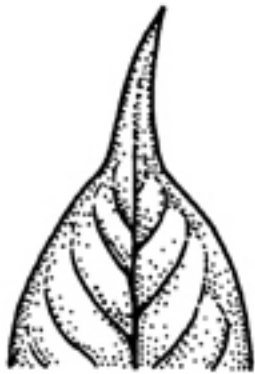
**BROADLY
ACUTE** **NARROWLY
ACUTE**



APICULATE



ARISTATE



CAUDATE



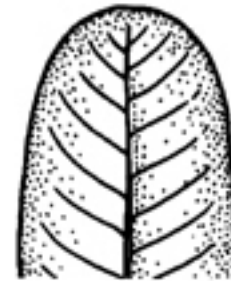
CUSPIDATE



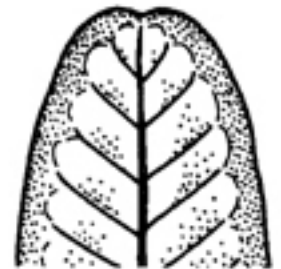
EMARGINATE



MUCRONATE

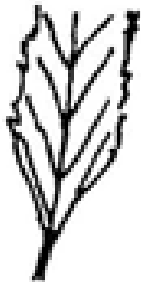


OBTUSE

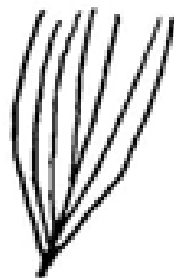


RETUSE

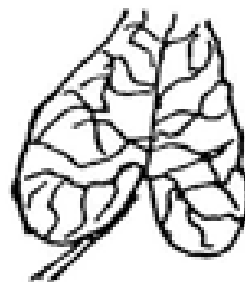
Leaf Bases



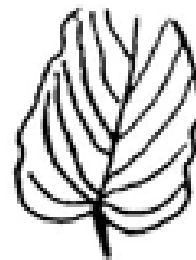
Attenuate



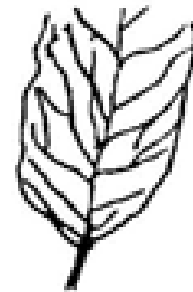
Acute



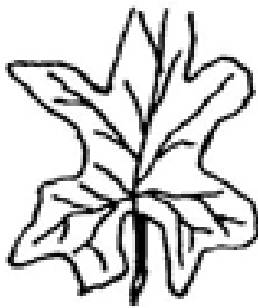
Auriculate



Cordate



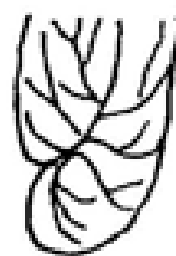
Cuneate



Hastate



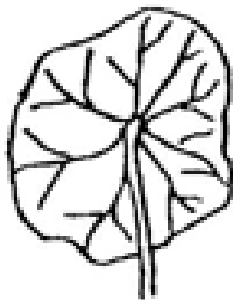
Oblique



Obtuse



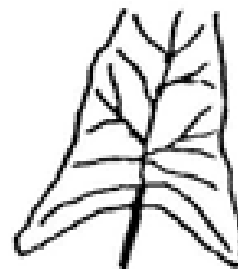
Obtuse-oblique



Peltate



Rounded

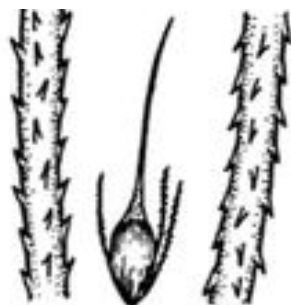


Sagittate



Truncate

Leaf Surfaces



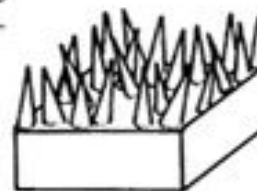
ANTRORSE RETRORSE
BARBELLATE



CANESCENT



COMOSE



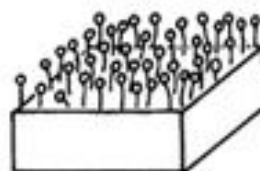
ECHINATE



FARINACEOUS



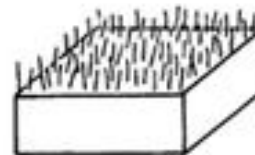
FLOCCOSE



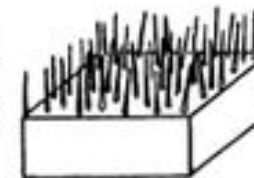
GLANDULAR



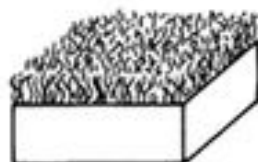
HIRSUTE



HIRTELLOUS



HISPID



LANATE



LEPIDOTE



MURICATE



PANNATE



PAPILLATE

Gymnosperm and Angiosperm Reproductive Structures

Gymnosperms – Woody cone bearing plants with naked seeds (Pinaceae, Cupressaceae)

Angiosperms – The flowering Plants (Monocots and Dicots)

Sporophyte
(independent)



Microscopic female gametophyte attached to female cones (dependent)

Microscopic male gametophytes attached to male cones (dependent)

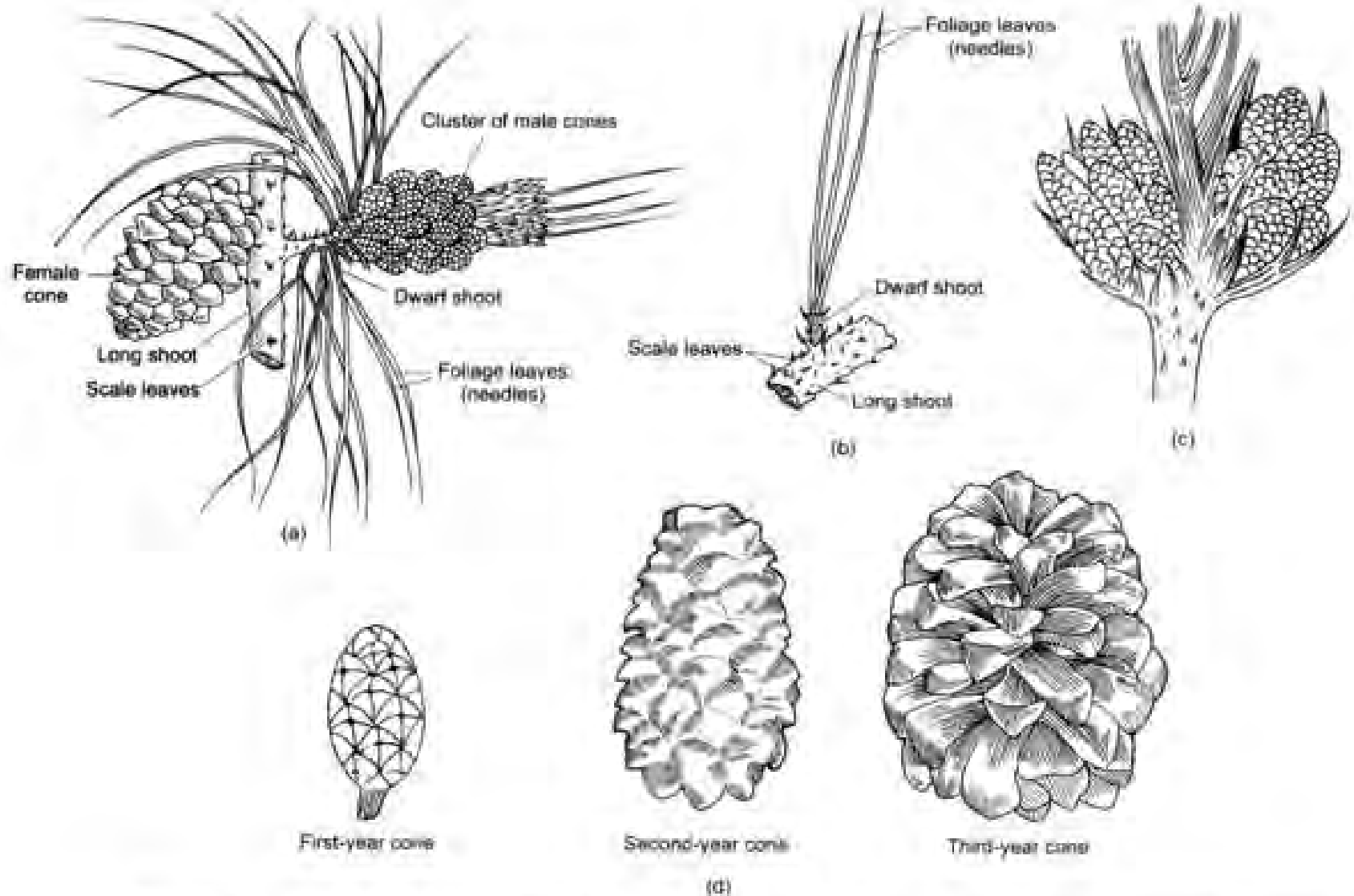
Sporophyte, which is the flowering plant (independent)



Microscopic male gametophytes inside these male parts of flowers (dependent)

Microscopic female gametophytes inside these female parts of flowers (dependent)

Gymnosperm Reproductive Structures



Pinus. (a) Long and dwarf shoots with male and female cones (b) A part of stem showing two types of leaves and branches (c) Cluster of male cones (d) Female cone in different stages





solitary



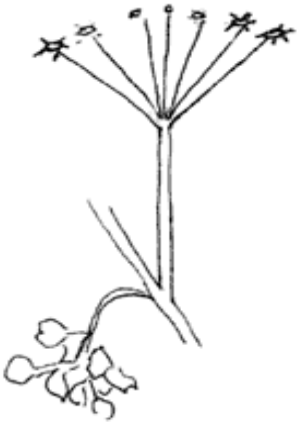
raceme



spike



**head or
capitulum**



**simple
umbel**



**compound
umbel**

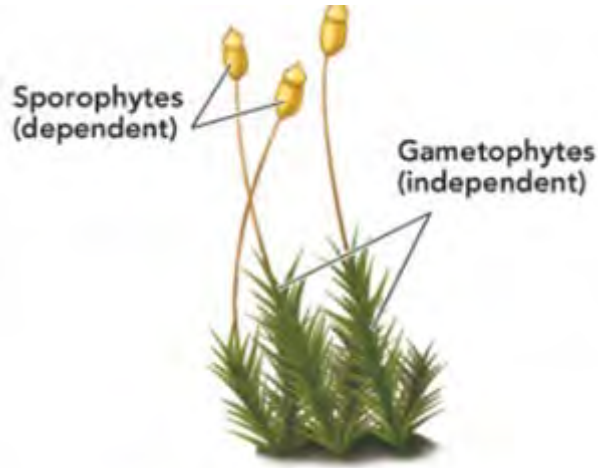


panicle

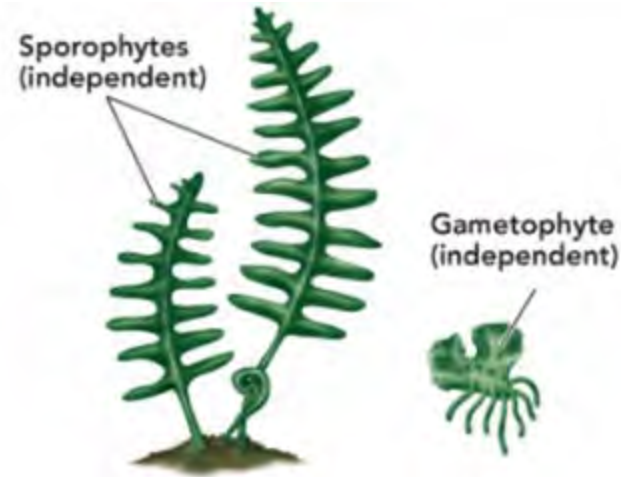


corymb

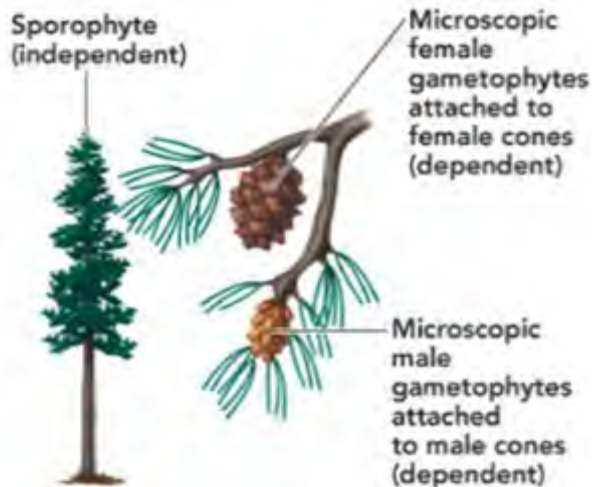
Bryophytes (Mosses, Liverworts & Hornworts)



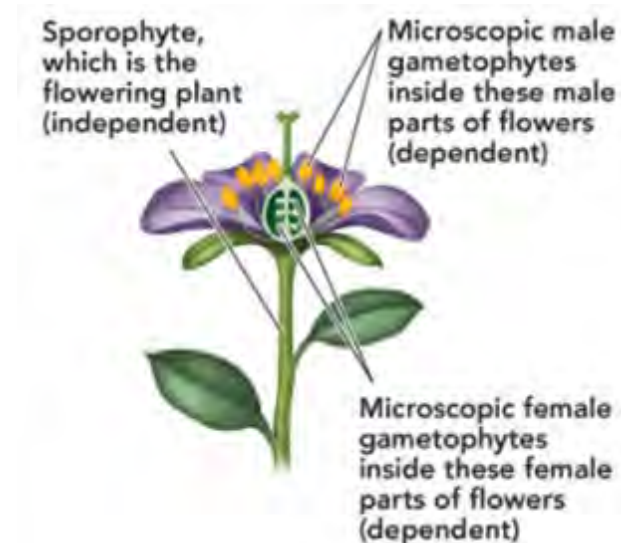
Pteridophytes – Vascular seedless plants (Ferns, *Equisetum* spp. and *Lycopodium* spp.)



Gymnosperms – Woody cone bearing plants with naked seeds (Pinaceae, Cupressaceae)



Angiosperms – The flowering Plants (Monocots and Dicots)



Major Plant Group Dichotomous Key

1. Plants lacking vascular tissue, roots, stems, leaves, and seeds; mainly reproducing by spores; gametophyte green and photosynthetic and dominant phase of life-cycle, Sporophyte non-photosynthetic and dependent on the Gametophyte – **BRYOPHYTES (Mosses, Liverworts and Hornworts)**.
1. Plants possessing true roots, stems and leaves; vascular tissue present; reproducing by spores or seeds; sporophyte is dominant phase of the life-cycle ----- 2
 2. Plants not producing flowers or seeds, mainly reproducing by spores; gametophyte and sporophyte generations independent at maturity (gametophytes sometimes subterranean, very small, or included in the spore wall) ----- **PTERIDOPHYTES (Fern and Fern Allies)**
 2. Plants reproducing by seeds; gametophytes reduced and enclosed entirely within tissues of the sporophyte at maturity, not independent ----- 3
 3. Flowers not produced; ovules not enclosed in an ovary, instead borne on the surface of a scale, the scales commonly grouped into a strobilus (cone), this becoming more-or-less woody in texture or berrylike at maturity; plants shrubs or trees with needlelike or scalelike leaves ----- **GYMNOSPERMS**
 3. Flowers are produced; ovules enclosed in an ovary, this becoming a fruit at maturity; plants herbs, shrubs, or trees with variously shaped leaves (if leaves all scale like or needlelike, then the plant is an herb) ----- **4 (ANGIOSPERMS)**

Major Plant Group Dichotomous Key

4. Flower parts (sepals, petals, stamens and pistils) or the perianth whorls mostly with multiples of 4 or 5 parts (rarely none); leaves often lacking sheaths, mostly with pinnate, palmate, or netted venation, the main veins usually not parallel and not joined only at the base and tip of the leaf blade; cotyledons usually 2 ----- **DICOTS**

4. Flower parts (sepals, petals, stamens and pistils) or perianth whorls mostly 3 or multiples of 3 (in flowers with modified perianth structure, such as grasses and sedges, the stamens and/or stigmas often in multiples of 3); the main veins usually parallel, joined at the base and tip of the leaf blade, the smaller veins parallel or forming a network; cotyledon 1 or less commonly absent; stem usually not forming a ring (appearing as 1 or more rings in groups with hollow stems) ----- **MONOCOTS**

Monocot

Dicot Monocot

Dicot



Embryos



One cotyledon

Two cotyledons



Leaf venation



Veins usually parallel

Veins usually netlike



Stems



Vascular tissue scattered

Vascular tissue usually arranged in ring



Roots



Root system usually fibrous (no main root)

Taproot (main root) usually present



Pollen



Pollen grain with one opening

Pollen grain with three openings



Flowers



Floral organs usually in multiples of three

Floral organs usually in multiples of four or five

A Modification of the Key to Groups of Wetland Plants in the Midwest*

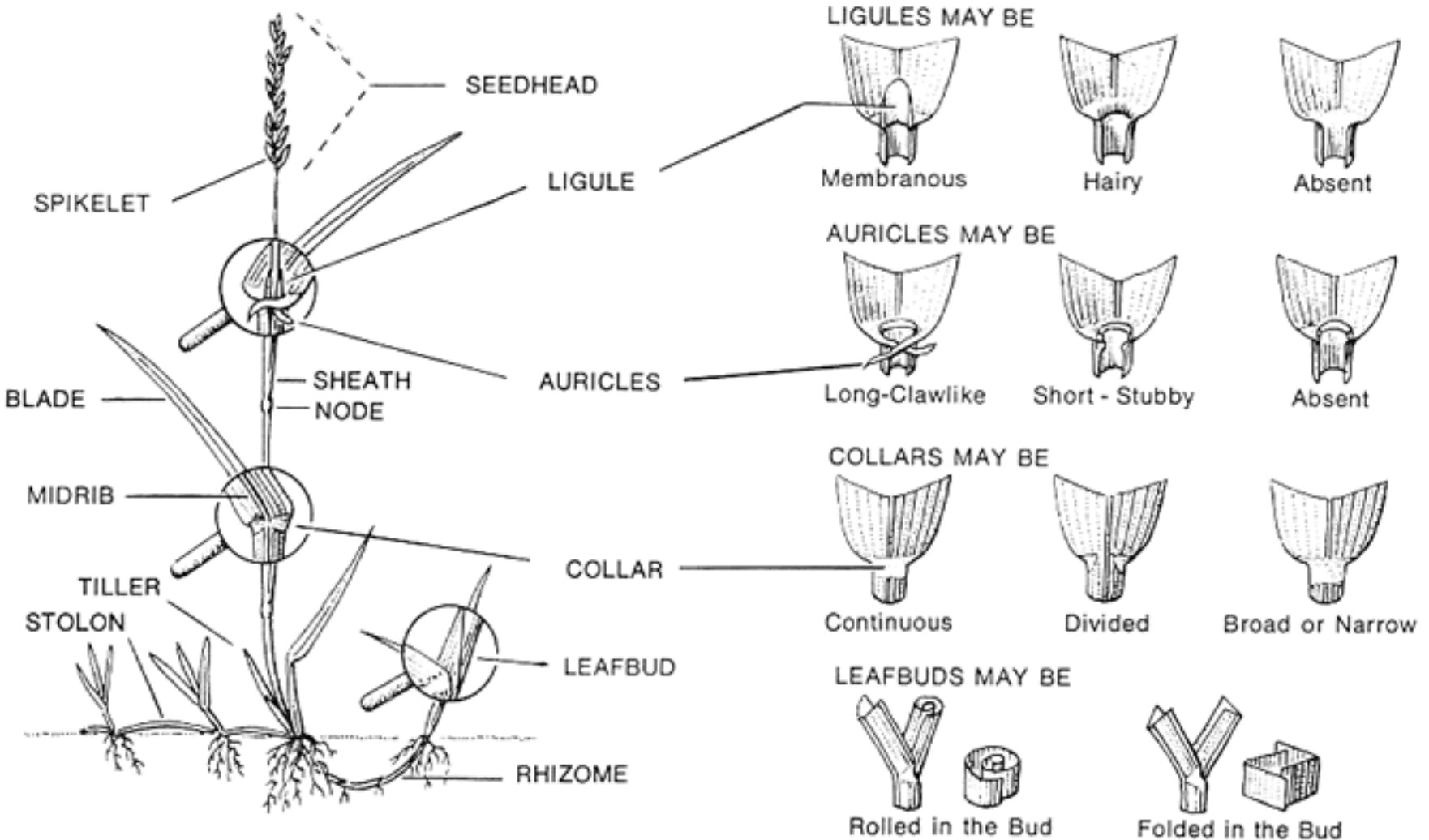
1. Plants vascular or non-vascular, reproducing by spores, not seeds ----- 2
1. Plants reproducing by seeds (naked or enclosed in an ovary), herbaceous or woody, reproductive structures either through cones or flowers ----- 3
2. Plants lacks vascular tissue; roots, stem and leaves absent ----- **Bryophytes**
2. Plants with vascular tissue; roots, stem and leaves present ----- Pteridophytes
3. Plants woody; naked seeds born on a scale in a woody cone ----- **Gymnosperms**
3. Herbaceous or woody plants that maybe aquatic or terrestrial with flowers (either showy or reduced); seeds borne within the ovary; fruits are produced ----- 4
(Angiosperms or Flowering Plants)
4. Parallel veins; flower parts usually in 3's or multiples there of ----- 5 (**Monocots**)
4. Netted leaf veins; flower parts usually in 4's or 5's or multiples there of --- 7 (**Dicots**)

Monocot Key

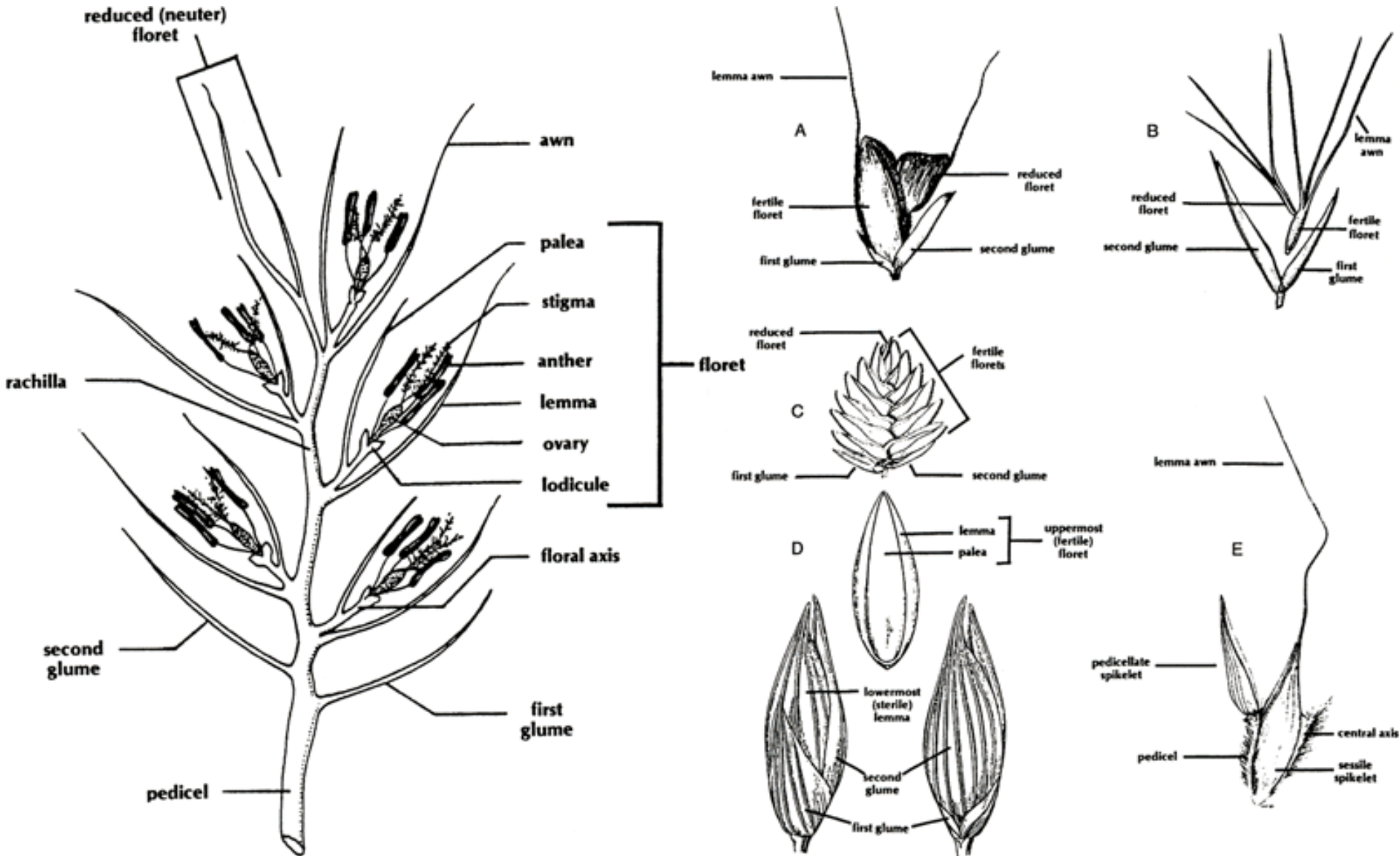
- 5. Plants without apparent sepals and petals or perianth, each flower associated with (often hidden) by scales or scale like structures with flowers arranged in spikelets ----- 6
 - 6. Leaves 2-ranked, the sheaths usually open; Stems typically hollow, round or flat (not triangular) and jointed; stamens with the anther attached to the middle with the filament ----- **Poaceae (Grasses)**
 - 6. Leaves 3-ranked, sheaths closed (maybe ruptured); stems typically triangular or round; stamens attached at the base of the filament ----- **Cyperaceae (Sedges)**
- 5. Flowers with normal sepals and petals (green or brown in Juncaceae), not arranged in spikes or spikelets ----- **other Monocots**

Poaceae habit and Morphology

Note leaves are two-ranked along the stem



Poaceae Inflorescence, Spikelets and Florets





Agrostis stolonifera L.
creeping bentgrass



Arundinaria gigantea (Walter)
Muhl. giant cane



Chasmanthium latifolium
(Michx.) Yates river oats





Cinna arundinacea L. sweet woodreed



***Dichanthelium clandestinum* (L.) Gould deertongue**



Dichanthelium acuminatum (Sw.) Gould & C.A. Clark
(tapered rosette grass)



***Panicum rigidulum* Bosc ex Nees redtop panicgrass**

Panicum virgatum L. switchgrass



1 mm

Steve Hurst, hosted by the USDA-NRCS PLANTS Database



Sphenopholis obtusata (Michx.) Scribn. prairie wedgescale



Echinochloa muricata (P. Beauv.)
Fernald rough barnyardgrass





Glyceria striata (Lam.) Hitchc.
fowl mannagrass



2 mm

***Leersia oryzoides* (L.) Sw. rice cutgrass**

Steve Hurst, hosted by the USDA-NRCS PLANTS Database



Paspalum fluitans (Elliott) Kunth horsetail paspalum



Douglas Ladd, hosted by the USDA-NRCS PLANTS Database / USDA SCS. 1989. *Midwest wetland flora: Field office illustrated guide to plant species*. Midwest National Technical Center, Lincoln.

Jose Hernandez, hosted by the USDA-NRCS PLANTS Database

Phalaris arundinacea L. reed canarygrass



Robert H. Mohlenbrock, hosted by the USDA-NRCS PLANTS Database / USDA NCS, 1989. *Midwest wetland flora: Field office illustrated guide to plant species*, Midwest National Technical Center, Lincoln.

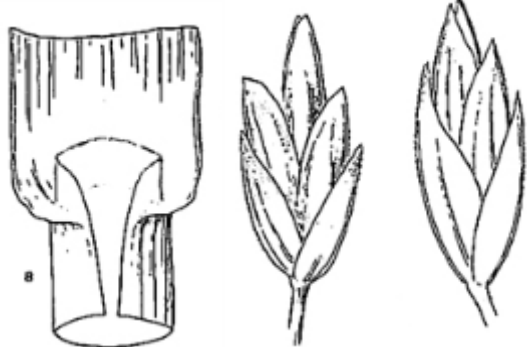


Steve Hurst, hosted by the USDA-NRCS PLANTS Databas

Sheri Hagwood, hosted by the USDA-NRCS PLANTS Database

Phragmites australis (Cav.) Trin. ex Steud. common reed





Steve Hurst, hosted by the USDA-NRCS PLANTS Database



Poa compressa. L Canada bluegrass

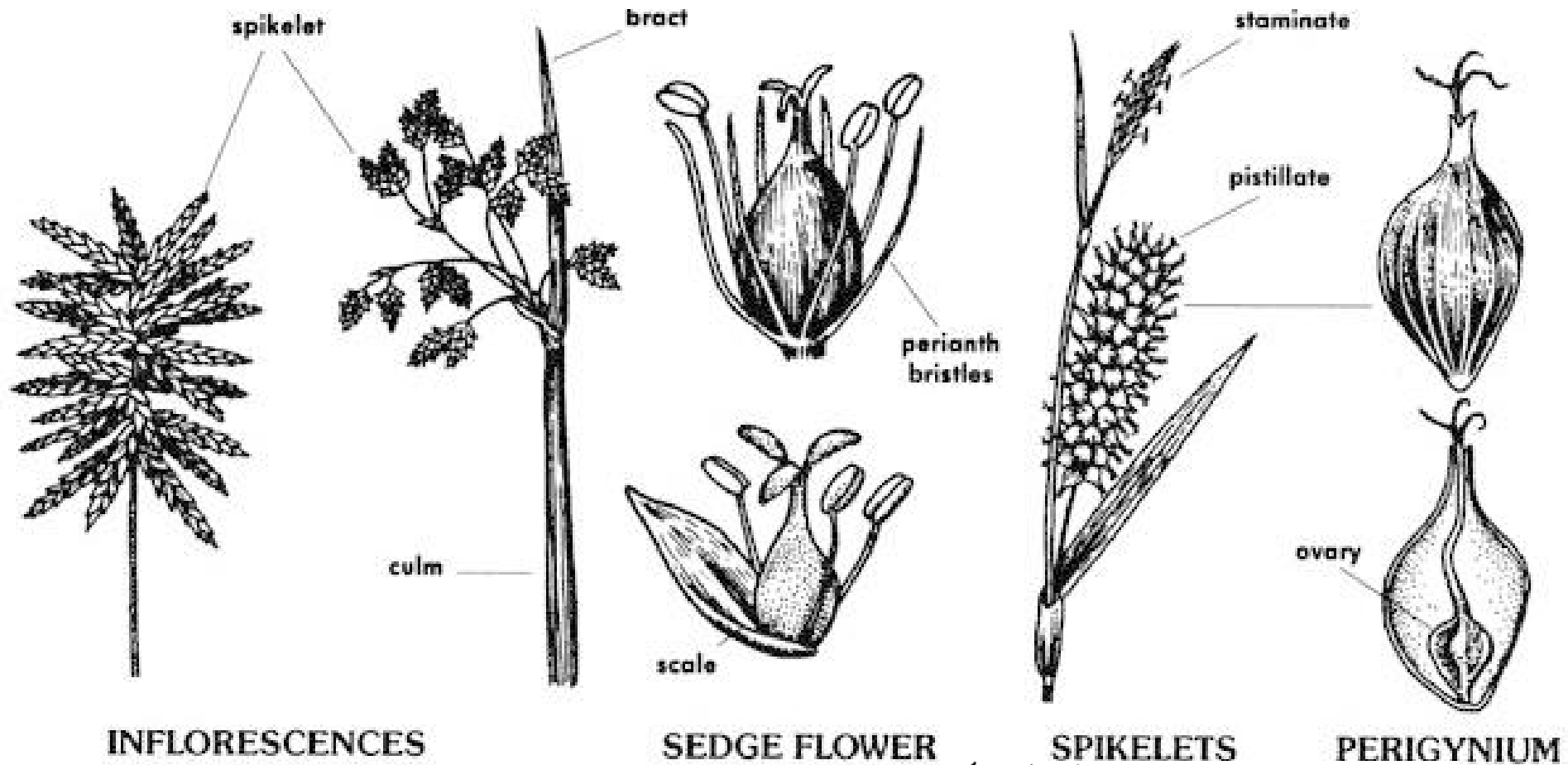


Spartina pectinata Bosc ex Link

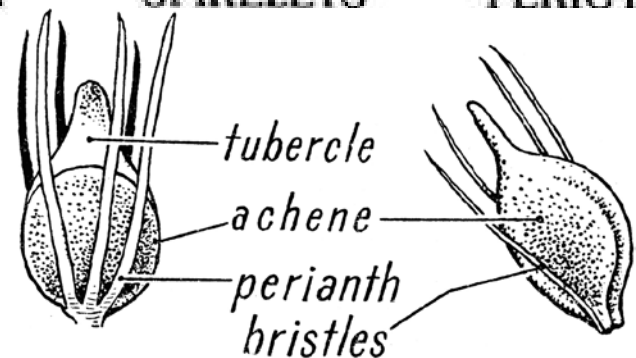


prairie cordgrass

Cyperaceae Inflorescence, Spikelets and Flower



leaves are three-ranked along the stem (stem typically triangular)





Carex conjuncta

Carex frankii





*Carex
granularis*



Carex hyalinolepis





Carex
lupulina





Carex radiata



Carex squarrosa





Carex
tribuloides



Carex vulpinoidea

Carex annectens

*Carex
vulpinoidea*



Eleocharis obtusa (Willd.) Schult.
blunt spikerush



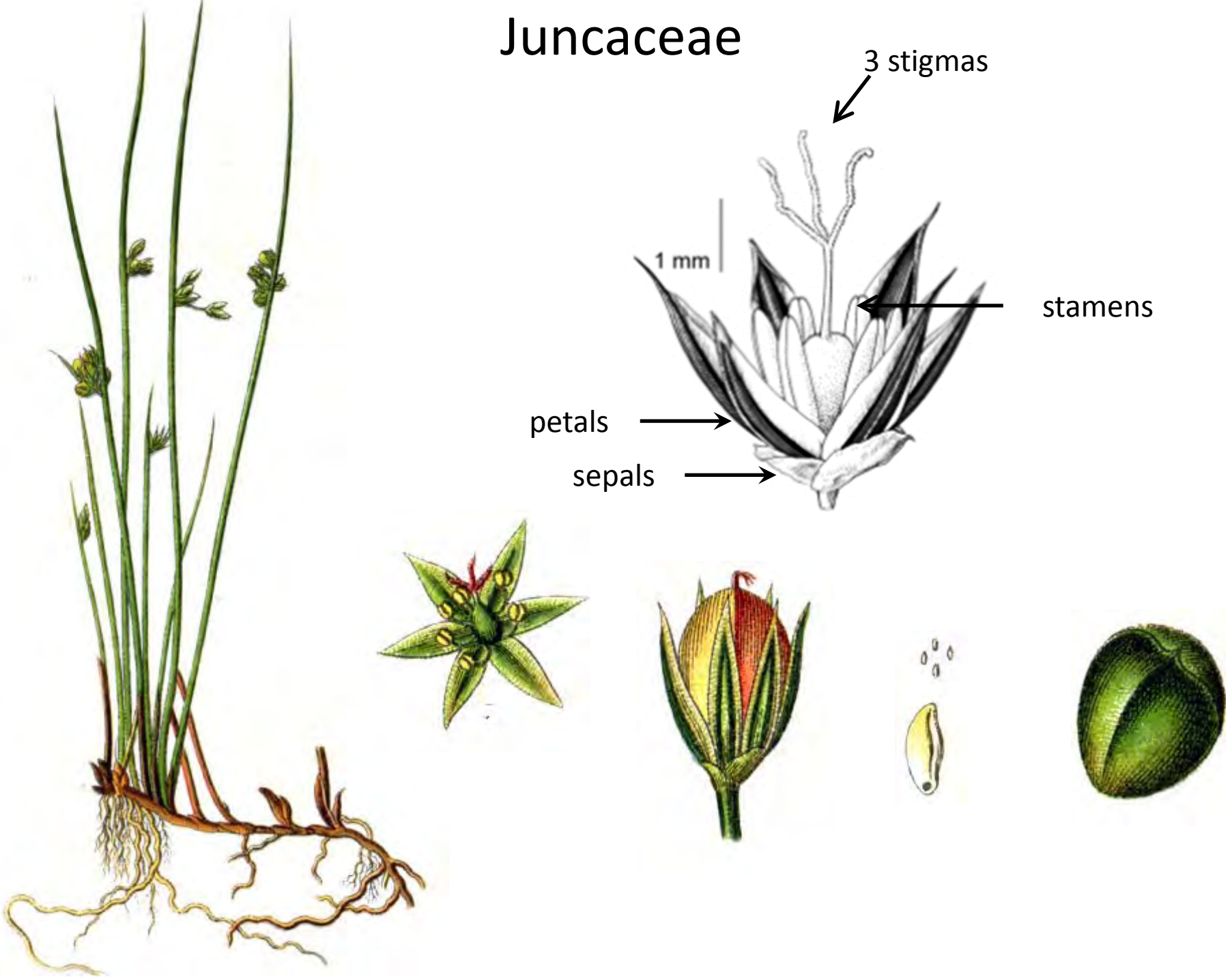
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Alisma subcordatum Raf.
American water plantain



Juncaceae



Juncus effusus L.
common rush



Juncus dudleyi Wiegand
Dudley's rush





***Typha angustifolia* L.**
narrowleaf cattail Staminate
and pistillate portions separated



***Typha latifolia* L.** broadleaf
cattail Staminate and pistillate
portions continuous

Dicot Key

- 7. Plants are woody (Trees, shrubs, vines; stems woody) ----- **Woody Dicots
(not discussed here)**
- 7. Plants are herbaceous; stems not woody ----- 8
- 8. Leaves compound; divided into distinct leaflets ----- **Dicots with Compound Leaves**
- 8. Leaves single and entire and not compound ----- 9
- 9. Most or all the leaves opposite or whorled -- Dicots with Opposite or Whorled Leaves
- 9. Most or all the leaves alternate ----- **Dicots with Alternate Leaves**

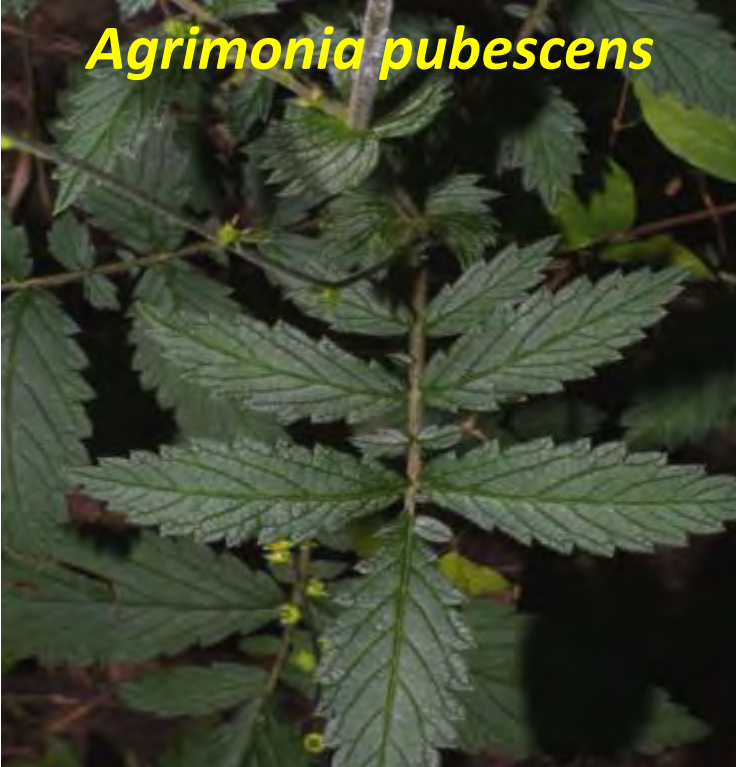
Rosaceae – Rose Family



Agrimonia pubescens



Agrimonia parviflora



Geum canadense Jacq. white avens



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Midwest wetland flora: Field office illustrated guide to plant species. Midwest
National Technical Center, Lincoln.



Rosaceae – Rose Family



***Amphicarpaea bracteata* (L.) Fernald**
American hogpeanut



***Apios americana* Medik. groundnut**



Fabaceae – Bean Family



Senna marilandica (L.) Link
Maryland senna

Fabaceae – Bean Family

***Bidens frondosa* L. devil's
beggartick**

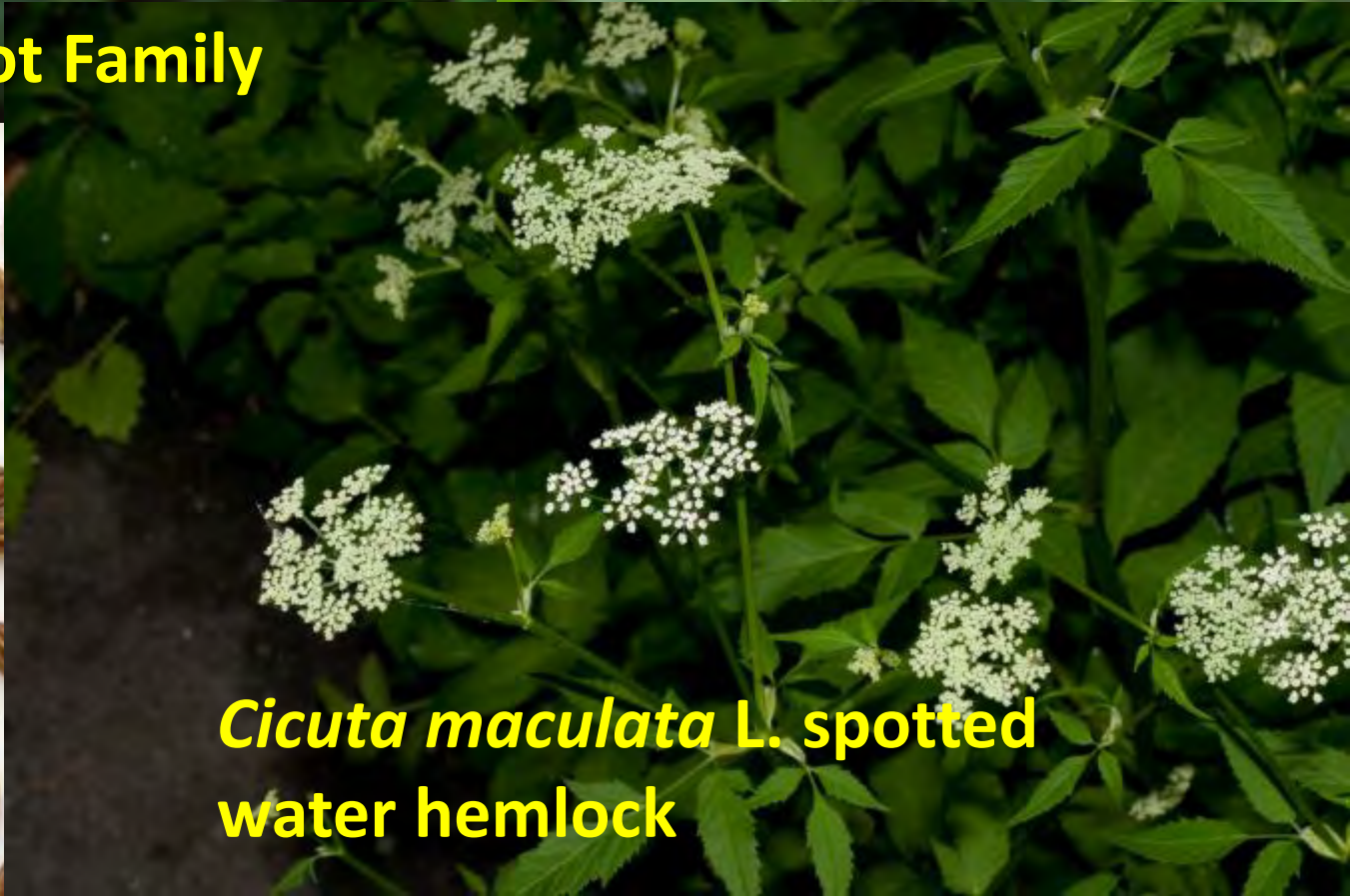


**Asteraceae – Composite or
Aster Family**





Apiaceae – Carrot Family



Cicuta maculata L. spotted water hemlock

Apiaceae – Carrot Family



Chaerophyllum procumbens
(L.) Crantz spreading chervil

Packera glabella (Poir.) C. Jeffrey butterweed



Asteraceae – Composite or
Aster Family



Dicot Key

- 7. Plants are woody (Trees, shrubs, vines; stems woody) ----- **Woody Dicots
(not discussed here)**
- 7. Plants are herbaceous; stems not woody ----- 8
- 8. Leaves compound; divided into distinct leaflets ----- **Dicots with Compound Leaves**
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**Scrophulariaceae – Figwort
Family**



***Agalinis purpurea* (L.)
Pennell purple false foxglove**

***Gratiola neglecta* Torr.
clammy hedgehyssop**

**Asteraceae – Composite or
Aster Family**



***Eupatorium perfoliatum* L.
common boneset**



***Eutrochium maculatum* (L.)
E.E. Lamont spotted joe pye
weed**



**Scrophulariaceae – Figwort
Family**



***Mimulus alatus* Aiton
sharpwing monkeyflower**



***Scutellaria lateriflora* L.
blue skullcap**



Rubiaceae – Madder Family



***Galium obtusum* Bigelow
bluntleaf bedstraw**

***Galium tinctorium* (L.)
Scop stiff marsh
bedstraw**

Urticaceae – Nettle Family

***Boehmeria cylindrica* (L.) Sw.**
smallspike false nettle



***Laportea canadensis* (L.) Weddell**
Canadian woodnettle

Lythraceae – Toothcup Family



***Ammannia coccinea* Rottb. valley redstem**

Apocynum cannabinum L.
Indianhemp



Apocynaceae –
Dogbane Family



Asclepias incarnata L. swamp
milkweed



Asclepiadaceae – Milkweed
Family

Dicot Key

- 7. Plants are woody (Trees, shrubs, vines; stems woody) ----- **Woody Dicots
(not discussed here)**
- 7. Plants are herbaceous; stems not woody ----- 8
- 8. Leaves compound; divided into distinct leaflets ----- **Dicots with Compound Leaves**
- 8. Leaves single and entire and not compound ----- 9
- 9. Most or all the leaves opposite or whorled -- Dicots with Opposite or Whorled Leaves
- 9. Most or all the leaves alternate ----- **Dicots with Alternate Leaves**



**Asteraceae – Composite or
Aster Family**



***Rudbeckia laciniata* L. cutleaf
coneflower**



***Solidago gigantea* Aiton
giant goldenrod**

**Polygonaceae – Smartweed
Family**



***Polygonum hydropiper* L.
marshpepper knotweed**



***Polygonum hydropiperoides*
Michx. swamp smartweed**



Thank You for Listening Today

1. Wetland Tour
2. Plant Habit
3. Plant Organs & Characteristics
 - 1) Roots
 - 2) Stems
 - 3) Leaves
4. Reproductive Organs
 - 1) Cones
 - 2) Flowers
5. Dichotomous Key
 - 1) Major Plant Groups
 - 2) Selected Monocot and Dicot Families



Schizaea pusilla