Lab 1: Campus hike and overview of included organisms

Overview

We will visit the UWO Herbarium in the basement of BGS, take a hike around campus and along the North branch of the Thames River nearby, and do a short computer exercise in HSB 13 (= South Valley Building).

Objectives

1. You will get a sense of what lies ahead in this course – the course objectives and the range of plants that we will study
2. You will learn the difference between flora and vegetation
3. You will see, and at least begin to learn to recognize, some of the dominant trees and shrubs on and near campus
4. You will begin to learn about plant families and the idea that, although naturalists (including you) can learn to recognize species of their local area, botanists learn to recognize families in order to better identify unfamiliar plants, especially when far from home
5. You will get an impression of how unnatural our local "natural areas" really are – dominated by non-native species, primarily from Eurasia
6. You will learn what a herbarium is and what it is good for.
7. You will get a "virtual tour" of Ontario's vegetation zones and an impression of how much remains of the natural vegetation.

Parts of the Lab

I. Introduction: we will go over some handouts on basic plant morphology and terms
II. The UWO Herbarium (BGS 0121)
III. Thames River flood plain forest
IV. The upland forest remnant
V. Campus plantings, including Carolinian and non-native species
VI. Computer Lab (HSB 13): GoogleEarth of Ontario vegetation. Complete on your own time.

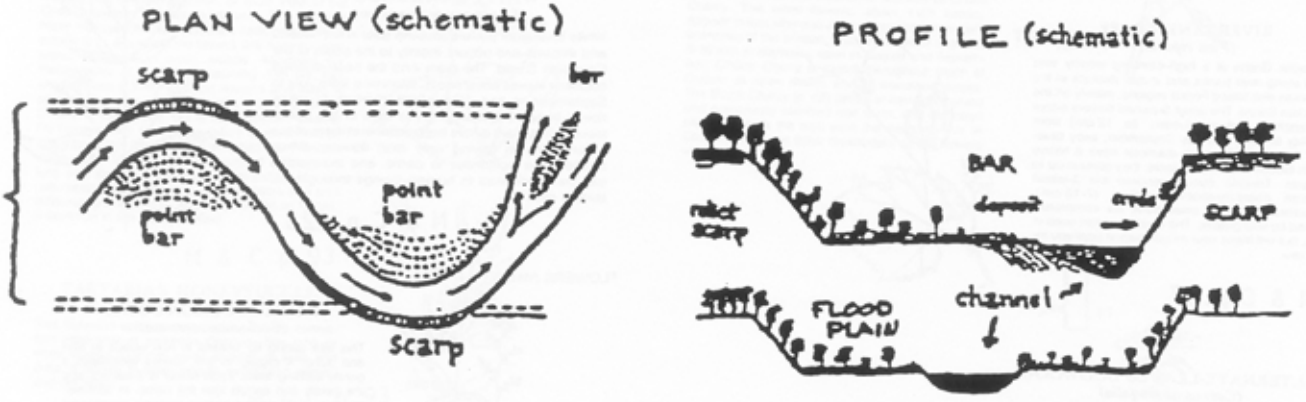
Your Assignment for Today (worth 2% of your course grade): Answer the questions in Part II, V & VI (in Lab 1 Assignment). Submit via WebCT by next Monday (and copy and paste into an email to me rgthorn@uwo.ca as back-up).

UWO Campus

The UWO campus contains areas of unmanaged vegetation as well as extensive plantings of both exotic and native species. We are most interested in the natural vegetation of the Thames flood plain and valley slopes, and the remnants of deciduous forests in upland areas.

A. THAMES FLOOD PLAIN AND SCARP: MOSAIC HABITATS

A flood plain is a low-lying, flat area surrounding a river. It is formed by two long-term geomorphic processes: river meandering and flooding. The sinuous curves of a river indicate adjacent areas of erosion and deposition. Riverbanks erode at the outer edge of each curve, and deposit sediment downstream along either the inner sides of curves (meanders) or in zones of reduced flow velocity, such as gravel/sand bars or point bars:



Over long periods of time, meandering rivers cut a wide swath of eroded and redeposited sediment. Rivers periodically flood this zone, depositing sediments over it. Thus, the flood plain is part of the "normal" channel of the river. The steep bank at the margin of a river is an erosional feature called a scarp. Relict scarps indicate former positions of meanders and can be seen, for example, west of the UWO Stadium.

The flood plain on campus includes both old, mature stands of deciduous forest species as well as different stages of colonization and succession from river-disturbed sites. Some areas are low and persistently moist, while others are higher and better drained. Tree fall gaps also create local disturbances. Thus, the flood plain can be viewed supporting a mosaic of vegetational communities rather than a uniform "type".

As is typical of disturbed and formerly disturbed sites near human habitation, this area contains exotic (=alien, introduced) species which have naturalized (spread like natives without further human influences). Alien species are marked by an asterisk (*).

III. FLOOD PLAIN FOREST

TREES

Acer [Maples]
- *negundo* [Ash-leaf]
- **platanoides* [Norway]
- *saccharinum* [Silver]
- *saccharum* [Sugar]

Celtis occidentalis [Hackberry]

Fraxinus americana [White Ash]

Juglans
- *cinerea* [Butternut]
- *nigra* [Black Walnut]

Platanus occidentalis [Sycamore]

Populus deltoides [Eastern Cottonwood]

Quercus macrocarpa [Bur Oak]

**Robinia pseudoacacia* [Black Locust]

Salix nigra [Black Willow]

Tilia americana [American Basswood]

Ulmus americana [White Elm]

SHRUBS & LIANAS

Clematis virginiana (L) [Virgin's bower]

Cornus alternifolia (S) [Alternate-leaved dogwood]

**Lonicera tatarica* (S) [European honeysuckle]

Parthenocissus quinquefolia (L) [Virginia creeper]

Physocarpus opulifolius (S) [Ninebark]

Prunus virginiana (S) [Choke cherry]

**Rhamnus cathartica* (S) [European buckthorn]

Rosa sp. (S/L) [Wild rose]

Rubus occidentalis (S/L) [Blackberry]

**Viburnum opulus* (S) [European highbush cranberry]

Vitis riparia (L) [River grape]

HERBS

**Aegopodium podagraria* [Goutweed]

Arisaema triphyllum [Jack-in-the-pulpit]

Eupatorium rugosum [White snakeroot]

Helianthus divaricatus [Woodland sunflower]

Lilium philadelphicum [Wood lily]

Matteucia struthiopteris [Ostrich fern]

**Polygonum japonicum* [Japanese knotweed]

Smilacina [Solomon's seal]
- *racemosa* [False]
- *stellata* [Starry]

Solidago canadensis [Canada goldenrod]

Thalictrum dioicum [Early meadow-rue]

Others:

_____

_____

_____

_____

FLOOD PLAIN FOREST

Note the high representation of vines (or lianas) in the flood plain forest.

23. CLEMATIS L.

Sepals petal-like, valvate in the bud, commonly 4, or more in some species. Petals none. Stamenodia present or none. Stamens numerous. Pistils numerous; ovule 1; style elongate. Fruit a flattened achene, terminated by the elongate persistent style. Herbaceous or woody plants, erect, or climbing by the prehensile leaf-rachis, with opposite simple or compound leaves, and solitary or panicled, usually dioecious, medium-sized flowers.

More than 100 species, widely distributed in temperate and subtropical lands; about a dozen others occur in our southern and western states. (Name from the Greek, klematis, a name for some climbing plant.) Several exotic species, hybrids, and horticultural forms are popular in cultivation. Our species fall naturally into three groups which are so distinct that they have been considered genera.

Sepals thin, spreading or ascending; plants climbing or scrambling; anthers not apiculate
Staminodia none; anthers glabrous. (Section *Flammula*.)
Flowers numerous, paniculate, white, 2-3 cm. wide.
Leaflets ordinarily 3 in well grown leaves, usually coarsely toothed; sepals sericeous on the back. 1. *C. virginiana*

1. **Clematis virginiana** L. Virgin's Bower. Stems climbing 2-3 m. high. Leaves ordinarily 3-foliolate; lateral and terminal leaflets similar, on stalks of approximately equal length, ovate, acuminate, rarely entire, commonly coarsely toothed with mucronate teeth, occasionally also lobed, the uppermost smaller and sometimes simple. Panicles from many axils, about equaling the subtending leaves. Sepals white or dull white, oval or oblong, 10-15 mm. long, pubescent on the back, glabrous or pubescent on the upper side. Achenes numerous in a globose head, pubescent, about 4 mm. long; style flexuous, strongly plumose, 2-4 cm. long.

Moist soil, July, Aug.
Var. **virginiana**. Leaves glabrous or scarcely pilose beneath; achenes with a thickened rounded margin. N. S. and e. Que. to Man., s. to Ga. and La.
Var. **missouriensis** (Rydb.) Palm. & Stey. Leaves softly sericeous beneath; achenes lacking a thickened rounded margin. Bruce Peninsula, Ont., to Minn., Neb., and Mo. [*C. missouriensis*, Rydb.]

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SHRUBS

HONEYSUCKLES

These shrubs have smooth-margined opposite leaves with short stalks, and tubular 5-parted flowers. The fruit is a several-seeded berry which may be red, orange, purplish, or blue. Four of the Ontario species are not illustrated. The vine-like Hairy Honeysuckle (*L. hirsuta*), reaching 3 m. is similar to *L. dioica* but the leaves are hairy on both sides. It occurs in open woods. Mountain Fly Honeysuckle (*L. villosa*), reaching 1 m. tall, has short-stalked (13 mm or less) flowers and fruits. It occurs in bogs and clearings from southern Ontario to James Bay, but is not common. Swamp Fly Honeysuckle (*L. oblongifolia*), is much like *L. canadensis*, but flowers later and has hairy undersides to the leaves. It is widespread but local in fens and swamps. Bracted Honeysuckle (*L. involucrata*), with green or purplish bracts (1.5 cm) subtending the flowers, and oval leaves to 15 cm. is common in the Boreal Forest.

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TARTARIAN HONEYSUCKLE
(Lonicera tatarica)

This Eurasian species has escaped from cultivation especially in southern Ontario. The pink or white flowers (1-2 cm long) appear in May and June. It occurs in open woods, woodland edges, and old fields.

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VIRGINIA CREEPER
(Parthenocissus quinquefolia)

Turning bright red in autumn, the palmately compound leaves of this woody climber trail over the forest floor and up tree trunks. Found mainly in the Carolinian zone, this plant has dull leaves, branched flower clusters with a central axis, bluish-black berries 5-7 mm across, and adhesive discs at the ends of the branched tendrils. Another Virginia Creeper, (*P. inserta*), has a more northern distribution, growing in the Mixed Forest as well as the Carolinian zone. It differs in having shiny leaves, fewer flowers in a more spreading inflorescence without a central stalk, fruits 8-10 mm, and no adhesive discs. Both species flower in June, and their fruits appear in August.

M & C p.95

NINEBARK
(Physocarpus opulifolius)

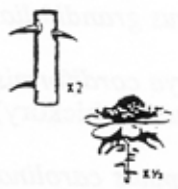
The shreddy bark and palmate leaves are characteristics shared with currants and gooseberries, but the persisting fruits (5-10 mm) of Ninebark are distinctive. The white flowers (7-10 mm) appear in June and July. Flower clusters are often abundant, and because of their numerous protruding stamens they have the soft appearance of *Spiraea* spp. Ninebark occurs in moist rocky or gravelly places throughout much of Ontario.

M & C p.72

CHOKE CHERRY
(Prunus virginiana)

More than 20 flowers in an elongate cluster (racceme), and leaves with numerous, narrow, spreading teeth, are distinctive features of Choke Cherry. The white flowers, about 1 cm across, appear in late May and June, terminating new leafy branches of the season. Dark red or black cherries, 8-10 mm in diameter, ripen in August and September. Choke Cherry is found throughout much of Ontario in open woods and at woodland edges. The Black Cherry (p. 49) differs in having incurved and apparently rounded leaf teeth, and the calyx persists where the stalk joins the maturing fruit. In Choke Cherry the calyx disappears as the flowers wither.

M & C p.61



16. **Rubus occidentalis** L. Black Raspberry. Stems erect or ascending, or sometimes arching and rooting at the tip, not glandular, glaucous the first year, becoming glabrous the second, sparsely beset with stout, straight or hooked spines with expanded bases, as are also the petioles and especially the pedicels. Leaflets commonly 3, occasionally 5 on the primocanes and the intermediate pair then adjacent to the lower pair; uppermost leaves of the floricane often simple; terminal leaflet broadly ovate, rounded or subcordate at base, sharply, deeply, and irregularly serrate; lower leaflets similar but smaller and narrower; all thinly gray-tomentose beneath. Flowers 3-7 in a dense umbelliform cluster; often 1 or 2 flowers also from the upper axils. Petals white, shorter than the sepals, narrowly obovate, at first erect, soon deciduous. Fruit commonly black, rarely varying to yellowish, about 1 cm. in diameter.

Dry or moist woods, fields, and thickets. Que. to N. D. and e. Col., s. to Ga. and Ark. May, June. Often cultivated in many horticultural varieties.

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McKay and Catling
"Trees, Shrubs & Flowers to Know in Ontario

Britton and Brown
"Illustrated Flora"

COMMON BUCKTHORN
(Rhamnus cathartica)

The smooth leaves 3-6 cm long may be opposite or alternate and usually have a distinctive fold at the tip. The veins curve toward the tip, like those of Dogwood. The foliage remains green late into the autumn, a characteristic shared with other plants introduced from Europe. Small greenish-yellow flowers appear in dense clusters in the leaf axels in early June. Purplish-black berry-like fruits, 5-6 mm long, ripen in August and September and normally have 2 or 4 stones. Stones occur where twigs divide and at the tips of some branches. The botanical name *cathartica* alludes to the fact that the fruits were once used medicinally as a cathartic, or laxative, but the results were so violent that their use was discontinued early in the history of botanical medicine. The fruits of all Buckthorns should be treated as poisonous. Common Buckthorn is found in woodlands and clearings in southern Ontario, often growing alongside our native trees and shrubs as it it has always been a part of the natural setting.

M & C p.66

GLOSSY BUCKTHORN
(Rhamnus frangula)

The smooth shiny leaves, 4-8 cm long, and purplish-black berry-like fruits with 3 or rarely 2 stones are good field marks. In June 1 to several small greenish-yellow flowers protrude from the leaf axels. The fruits are red at first, becoming purplish-black when ripe. This introduced European shrub has become locally abundant in moist woods about cities and towns in southern Ontario.

RIVERBANK GRAPE
(Vitis riparia)

Riverbank Grape is a high-climbing woody vine found along river banks and in rich thickets in the Carolinian and Mixed Forest regions, mainly off the Canadian Shield. The small 5-parted flowers occur in branched axillary clusters (to 12 cm) from mid-May to early July. By September, juicy blue-black berries 8-12 mm in diameter have a heavy whitish bloom and an acid tassle, they contain up to 4 seeds. Tendrils occur opposite the 3-lobed roundish coarsely-toothed leaves (7-15 cm). Sometimes shrubs or small trees are completely covered by wild grapes. The fruits are often used in jellies, but will make your mouth pucker up if you try them raw.

M & C p.97

ALTERNATE-LEAVED DOGWOOD
(Cornus alternifolia)

The whitish or creamy flowers are borne in flat-topped clusters and, like other Dogwoods, they differ from Viburnums in that the floral parts are in fours rather than fives. Flowers appear in May and June, and the dark-blue, berry-like fruits, less than 1 cm long, ripen on red stalks during July and August. The smooth leaves are dark green above and greyish-green below, and unlike our other Dogwoods, they occur in groups and are alternate on the twigs. The branches are also alternate and usually arranged in distinct horizontal layers, perhaps giving rise to the common name Pagoda Tree. The bark is reddish-brown and smooth, becoming broken into shallow ridges with age. Found in the Deciduous and Mixed Forest regions. Alternate-leaved Dogwood is a shade-tolerant understory species in rich woodlands.

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1. **Aegopodium Podagraria** L. Goutweed. Stems erect, branched, 4–9 dm. tall. Lower leaves long-petioled, mostly biternate with 9 leaflets but often irregular; leaflets oblong to ovate, 3–8 cm. long, sharply serrate. Upper leaves reduced, short-petioled, chiefly once ternate. Umbels dense, 6–12 cm. wide; primary rays 15–25, nearly equal. Fruit 3–4 mm. long.

Native of Eurasia; cultivated in old-fashioned gardens and often escaped in the ne. states, especially in moist, partially shaded places. Most cultivated plants are known horticulturally as var. *variegatum*, having leaves margined with white.

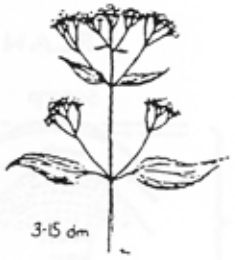
B & B 2: 623

Jack-in-the-pulpit (*Arisaema triphyllum*) is a common sight in moist rich woods and thickets in the spring. The leaves look like those of Poison Ivy except that the 3 leaflets are stalkless and their veins are joined along the margin. This plant occurs throughout the Carolinian and Mixed Forest region. In autumn, bright clusters (3-6 cm long) of red berries are produced. Confined to damp woods in the Carolinian zone, the Green Dragon (*A. dracontium*) has a long tapering green spadix, projecting up to 10 cm beyond the slender green spathe. Its single leaf is irregularly divided into 5-17 leaflets.

M & C p. 186

FLOWERS (WHITE)

WHITE SNAKEROOT
(Eupatorium rugosum)



White Snakeroot prefers alkaline soils in rich woods and thickets and occurs mainly to the south of the Canadian Shield. The stem and the heart-shaped opposite leaves are smooth. Blooming from July to September, it has flat-topped clusters of white flower heads originating in the axils of the upper leaves. This plant differs from other members of the Aster family in having only disc flowers. White Snakeroot is poisonous to cattle, and the poison can be transmitted to human beings through the tainted milk.

M & C p.123

FLOWERS (WHITE)

FALSE SOLOMON'S SEAL
(Smilacina racemosa)

This late spring lily blooms in rich woods in May and June. A cluster of tiny flowers terminates a gently arching stem. Each flower is 6-parted, and the petals and sepals look the same. In summer the brownish striped, berries become translucent red. The stem zigzags between each of the alternate short-petioled leaves. These look similar to the leaves of the true Solomon's Seal, which is readily distinguished by its bell-like yellowish flowers. Of the 3 species of *Smilacina* in Ontario, *S. racemosa* is the most commonly encountered.

M & C p.100

STARRY FALSE SOLOMON'S SEAL
(Smilacina stellata)

Shorter than the above, but with fewer and larger flowers, this close relative grows in moist open places, or on sandy ground (especially dunes) along the Great Lakes. It blooms from May to July. The pale-green leaves with their parallel veins pattern clasp the zigzagging stem. An open colony is often produced, since the rhizomes branch freely and send out new erect or slightly arching shoots. The berries are deep red at maturity, but are speckled or striped while developing. The even smaller Bog Solomon's Seal (*S. trifolia*) occurs in wet woods or bogs. Its 2 or 3 leaves almost sheath the stem and it has a more open raceme.

CANADA GOLDENROD
(Solidago canadensis)

FLOWERS (YELLOW)

Our most common Goldenrod, its graceful yellow plumes are obvious in August and September along roadsides and in clearings or thickets throughout the Carolinian and Mixed Forest regions. Each of the small flower heads is held on the upper side of a spreading, often curved branch. The inflorescence is about as wide as it is tall. The stems are densely leafy and smooth at the base, but downy toward the top. By flowering time the basal leaves have disappeared. The largest leaves are halfway along the stem. Two prominent veins on each side of the mid-vein are distinctive. This plant was introduced into Europe for garden

STREAMBANK AND GRAVEL BAR

H

H. SANDBAR-WILLOW (*Salix interior*)
Leaves smooth and pale below. Catkins appear after leaves. Mature fruit 7-10 mm, smooth. River banks and lake shores. Most abundant in the south.

Trees

Populus deltoides
(cottonwood)

Platanus occidentalis
(sycamore)

Ulmus americana
(white elm)

Shrubs

Salix interior
(sandbar willow)

B. THE UPLAND FOREST (remnant)

Although this woodlot is small, the centre of it is very well shaded by the dense canopy, like other beech-maple forests in Ontario. Note the sparse understory and few herbs, despite the rich humus from decaying vegetation. The floor presents a very different picture in April and May when the spring ephemerals carpet the floor. Note (next spring) trillium, trout lilies, jack-in-the-pulpits, etc. Observe that there is greater growth in the run-off channels.

Trees

Acer saccharum

Fagus grandifolia

Carya cordiformis
(bitternut hickory)

Carpinus carolinana
(blue-beech)

Fraxinus americana

Ostrya virginiana
(ironwood)

Tilia americana
(linden)

Prunus serotina
(black cherry)

Acer nigum
(black maple)

Juglans nigra
(black walnut)

Shrubs

Euonymus obovatus
(running strawberry-bush)

Prunus virginiana
(choke cherry)

Herbs

Smilacina racemosa
(false Solomon's seal)

RUNNING STRAWBERRY-BUSH
(Euonymus obovatus)

A low creeping shrub with erect greenish branches. Running Strawberry-bush is generally inconspicuous among the other plants on the forest floor; but in September, when its unusual fruits ripen, it really catches the eye. The spiny 3-lobed capsules (1-1.5 cm) are pinkish or crimson and open (to 2.5 cm) exposing orange to scarlet-coated arieds. The small greenish flowers (5-10 mm across) appear in late May and June. Smooth finely toothed leaves reach 8 cm in length. In Ontario, Running Strawberry-bush is confined to rich woodlands in the Carolinian zone. The closely related Burning Bush (*E. atropurpureus*), an erect shrub to 6 m with smooth 4-lobed fruits, is rare.

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McKay and Catling
"Trees, Shrubs & Flowers
to Know in Ontario

BOTANICAL LANGUAGE, used in keys and descriptive literature
These are USEFUL prefixes to know.

Prefix	Meaning	Examples
a-	without	apedicellate asepalous asexual
e-	without	estipulate
apo-	separate	apopetalous apocarpous
bi-	two	bilabiate bifurcate
con-	together	connate
di-	two	dioecious
endo-	inner	endocarp
epi-	upon	epicalyx epipetalous
exo-	outer	exocarp
hypo-	below	hypogynous
meri-	part	mericarp
meso-	middle	mesocarp
per-	around or about	perianth perigynium
sub-	below	subtend submersed
syn or sym-	with	sympetalous synsepalous
uni-	one	unilocular unisexual

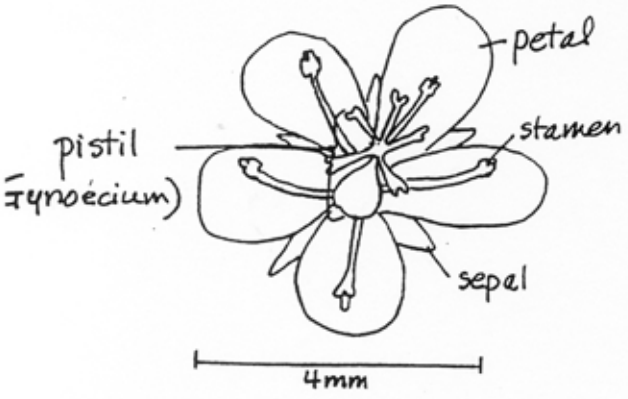
SAMPLE . FAMILY LAYOUT

Plant family Somethingaceae $K^5C^5A^5\underline{G}^{(3-5)}$ Your name

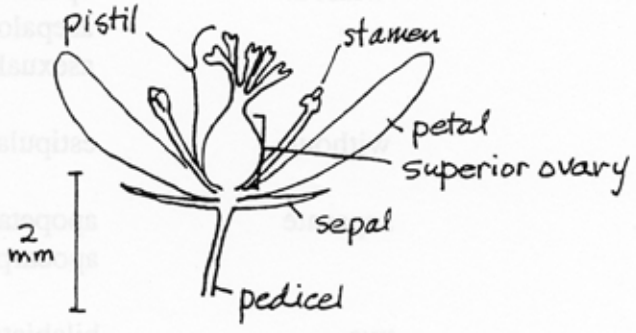
Species example of family (underlined Latin name) Date

Ontario examples of family (underlined Latin names)

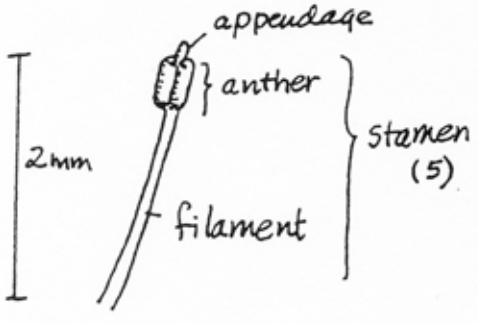
Top view flower $K^5C^5A^5\underline{G}^{(5)}$



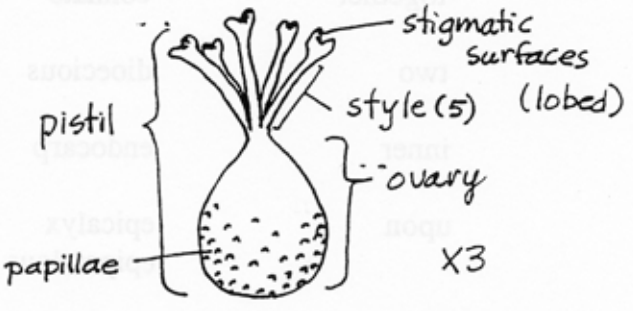
Longitudinal section flower



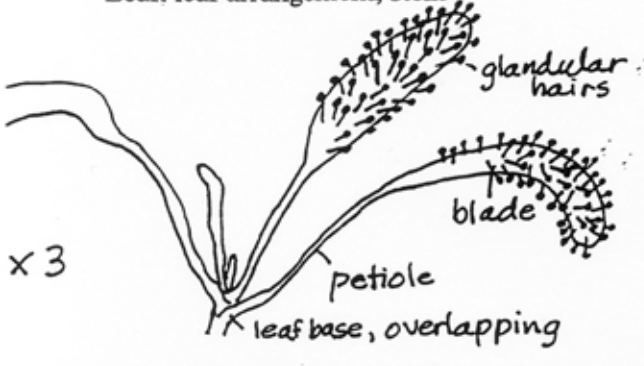
Detail of stamen (s), androecium



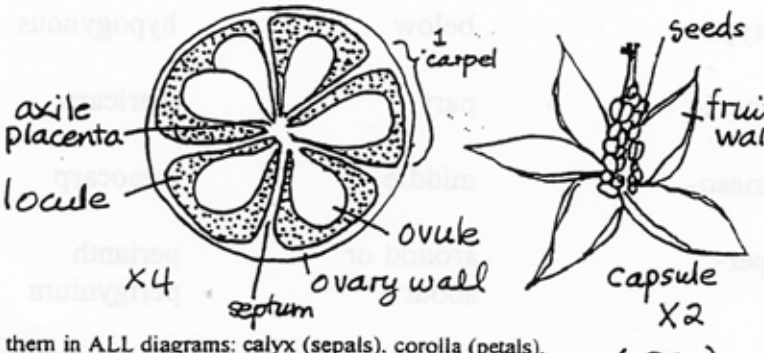
External detail of pistil(s), gynoecium



Leaf, leaf arrangement, stem



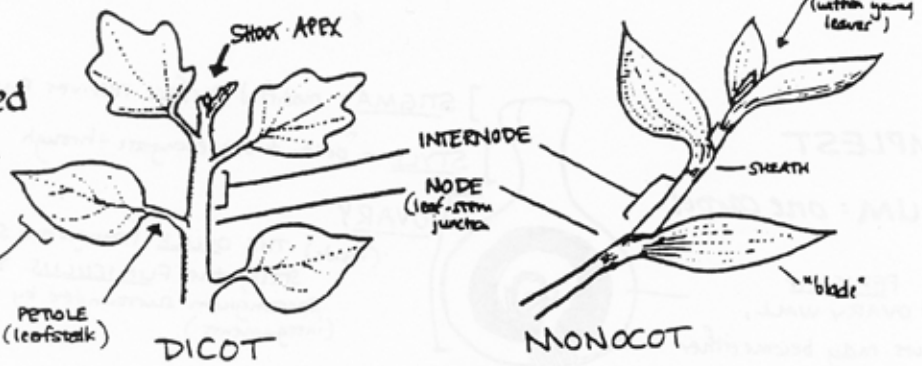
Cross section of ovary, with placentation, fruit with seed



(On each of the plants recognize the following and label them in ALL diagrams: calyx (sepals), corolla (petals), androecium (stamen, anther, filament), gynoecium (pistil, ovary, stigma, style, ovule, placenta), pedicel, leaf blade, petiole, PLUS features peculiar to each particular family. Indicate a scale e.g., 2 cm or magnification e.g., X 2 for each illustration) Draw large, expanding into a second page if necessary to show detail accurately.

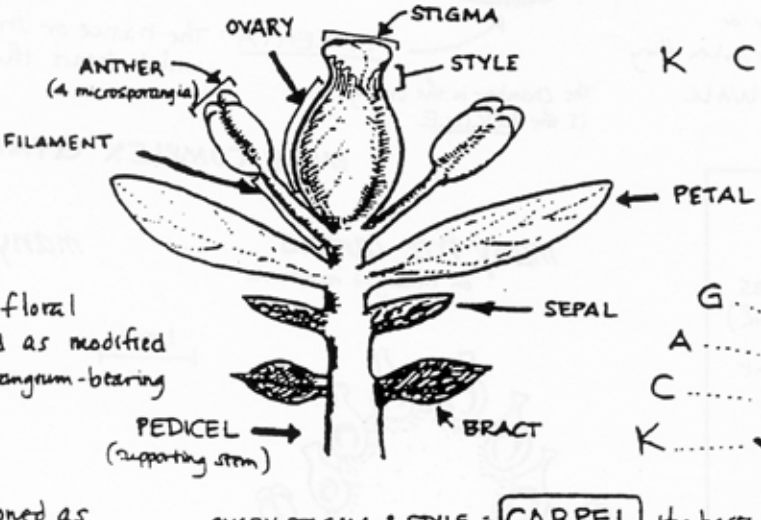
BIOLOGY 204a
Basic Plant Morphology

An oversimplified VEGETATIVE SHOOT (Angiosperm)

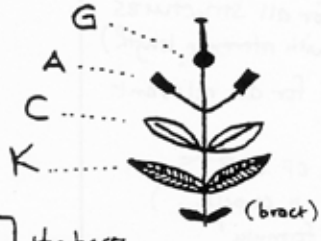


An oversimplified, archetypical FLOWER

K C A G



The various whorls of floral appendages are interpreted as modified SPOROPHYLLS (leaf-like, sporangium-bearing structures).



The carpel has been envisioned as sporangium-bearing "leaf" with its margins folded together, fused, and modified.

The stamen has been compared with a reduced, modified sporangium-bearing "leaf."

BRACTS are MODIFIED VEGETATIVE LEAVES, and are not true flower parts. They may participate in the structure of modified, complex flowers, however.

If the SHOOT AXIS around the calyx is swollen or developed, it is termed a RECEPTACLE.

OVARY, STIGMA & STYLE = **CARPEL**, the basic "female" unit. The carpels collectively form the GYNOECIUM (G)

ANTHER, FILAMENT = **STAMEN** the basic "male" unit. The stamens collectively form the ANDROECIUM (A)

PETAL - usually non-green; modified to attract pollinators. Absent or modified in wind-pollinated flowers. Collectively, petals comprise the COROLLA (C)

SEPAL - may be petal-like or leaf-like. The collective unit of sepals, the CALYX, often encloses and protects the other whorls in the flower bud stage. (K)

BIOLOGY 204a
Basic Plant Morphology

THE SIMPLEST GYNOECIUM: one carpel

] STIGMA - modified surface receives POLLEN

] STYLE - pollen tubes elongate through

OVARY

(inside) THE OVULE (embryonic seed) on its short stalk, the FUNICULUS The ovule is a sporangium surrounded by sheathing structures (integuments)

PERICARP or OVARY WALL, Tissues may become either SOFT AND FLESHY or HARD AND STONY when they become FRUIT WALL

PLACENTA: The tissue or structure which bears the OVULE

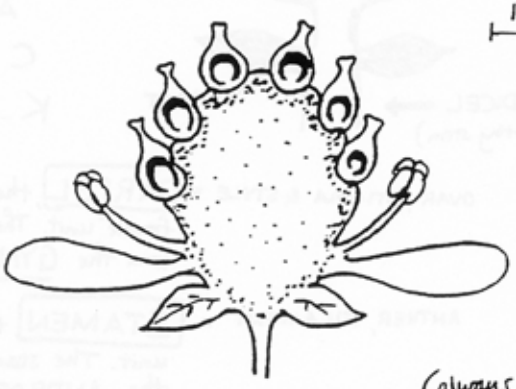
The chamber in the ovary is the LOCULE

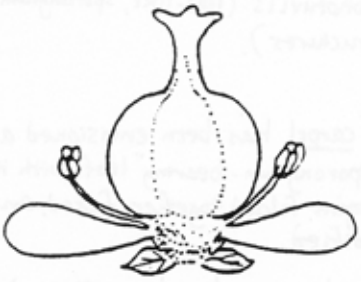
MORE COMPLEX GYNOECIA

many free carpels on enlarged receptacle

many united, fused carpels

1 mm

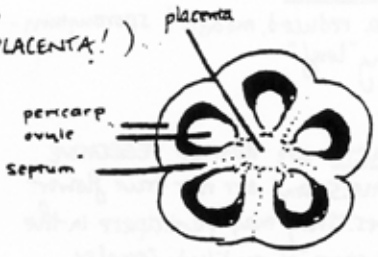




X-section

RECEPTACLE

(always note position of PLACENTA!)



ALWAYS RECORD IN YOUR NOTES:

- SCALE for all structures (with reference length)
- LABELS for all relevant parts
- NUMBER OF PARTS (n stamens, n carpels...) Use floral formula!
- PLACENTATION of gynoecium, and number of locules
- CROSS-SECTION and LONG SECTION of gynoecium under magnification
- PLAN and/or PROFILE view of flower
- Relevant descriptions in point form which clarify your diagram

OTHER TIPS:

- DRAW LARGE FIGURES!
- Begin with light lines (sketch proportions and shape) but finish with dark lines.
- Emphasize FORM, STRUCTURE — not detail.