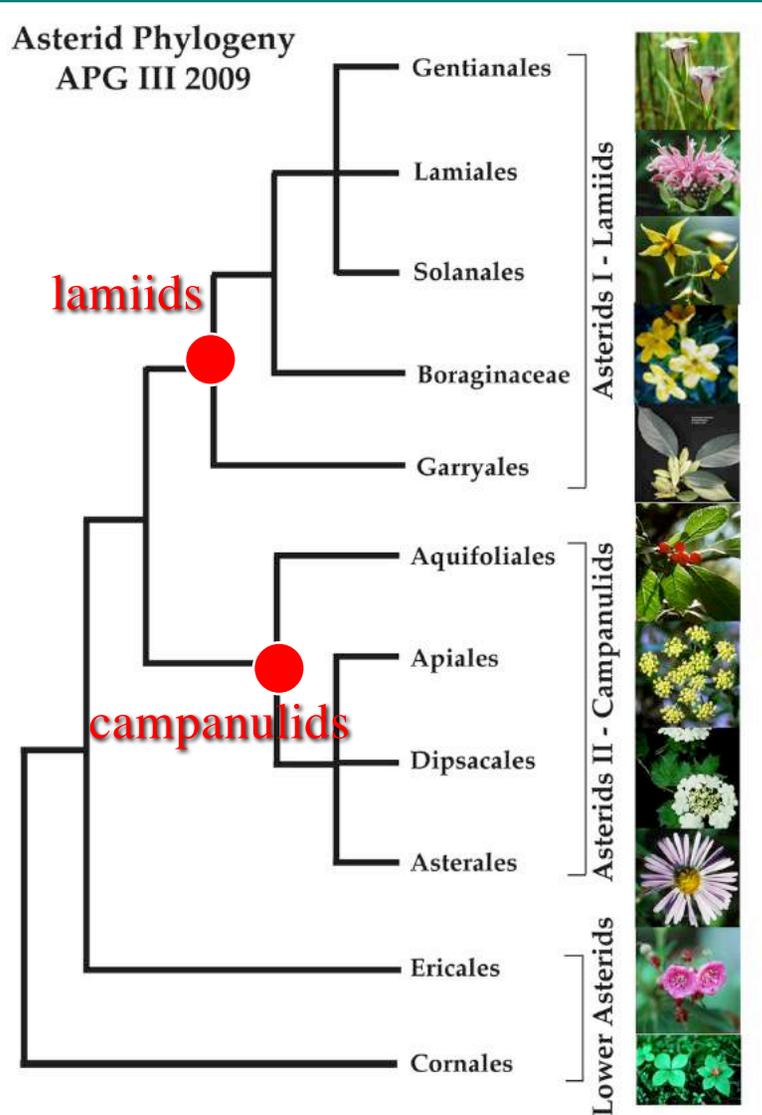
The background of the slide features two vibrant pink flowers with five petals each, set against a backdrop of lush green leaves. The leaves are covered in small, clear water droplets, suggesting a recent rain or dew. The lighting is soft, highlighting the texture of the petals and the veins on the leaves.

Diversity and Evolution of Asterids

... gentians, milkweeds, and
potatoes ...

Core Asterids



- two well supported lineages of the ‘true’ or core asterids

- ‘lamiid’ or Asterid I group
- ‘campanulid’ or Asterid II group

- appear to have the typical fused **corolla derived independently** and via two different floral developmental pathways



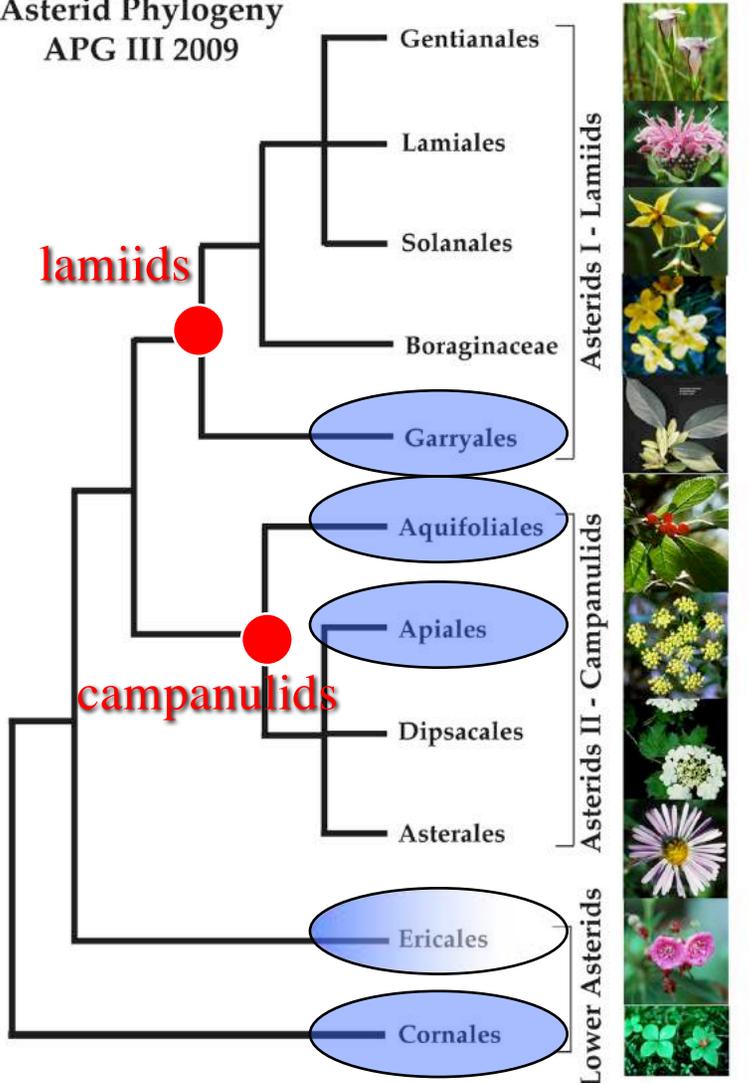
lamiid



campanulid

Core Asterids

Asterid Phylogeny
APG III 2009



- two well supported lineages of the ‘true’ or core asterids

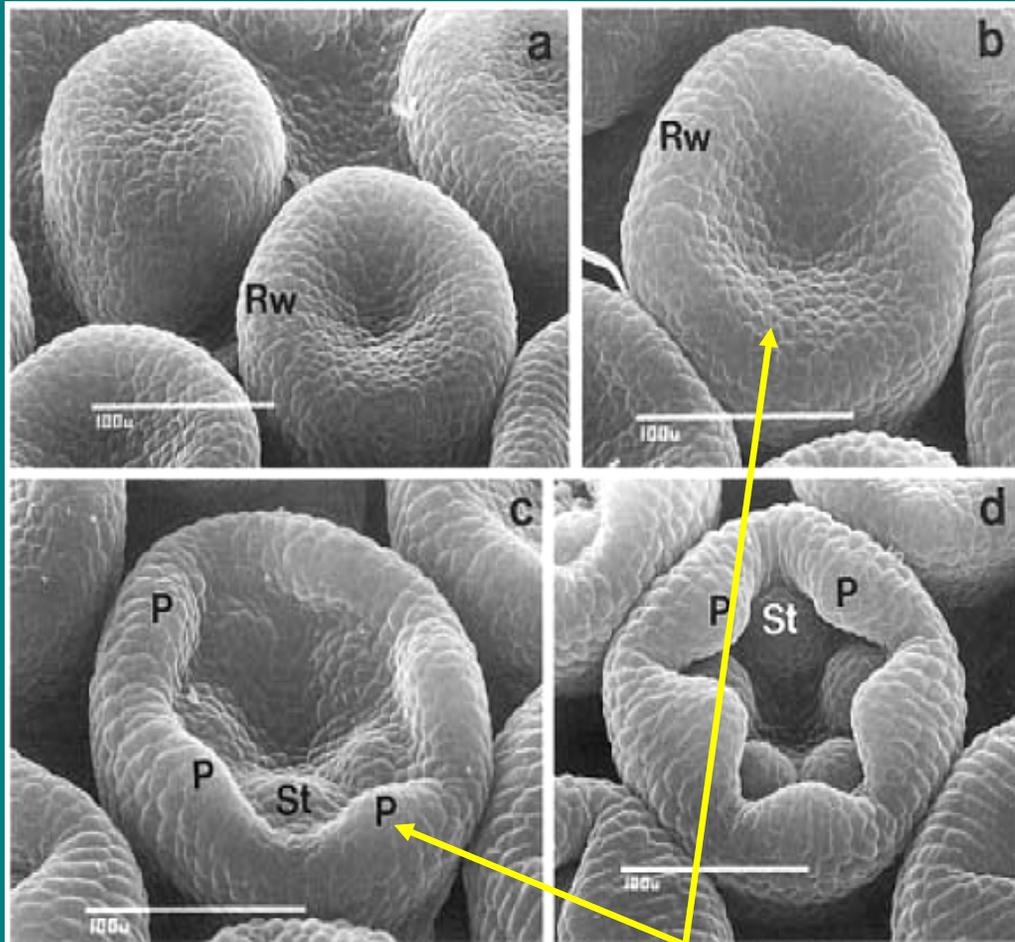
 = NOT fused corolla tube

- Asterids primitively NOT fused corolla at maturity
- 2 separate origins of fused petals in “core” Asterids (plus several times in Ericales)

Early vs. Late Sympetaly

euasterids II - campanulids

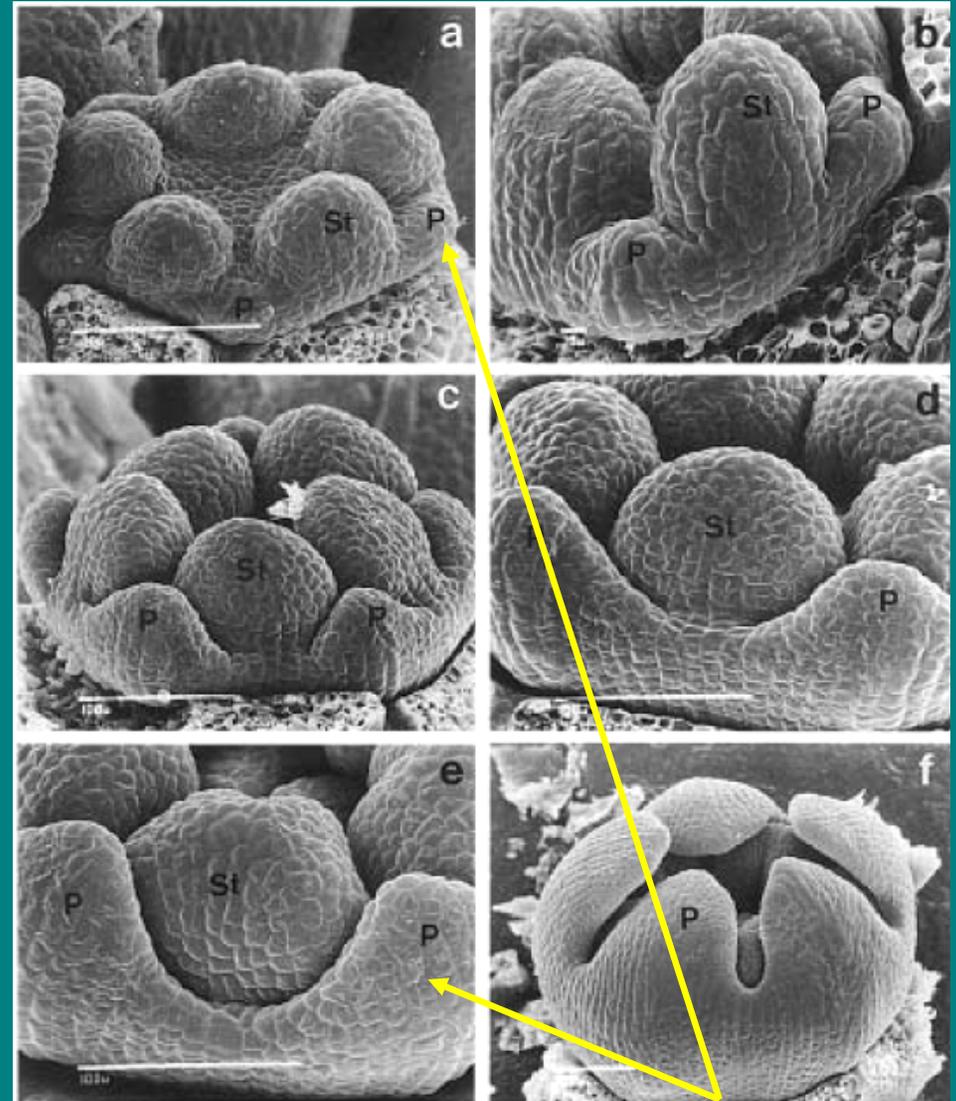
euasterids I - lamiids



Calendula, Asteraceae

early

also in Cornaceae of
"basal asterids"

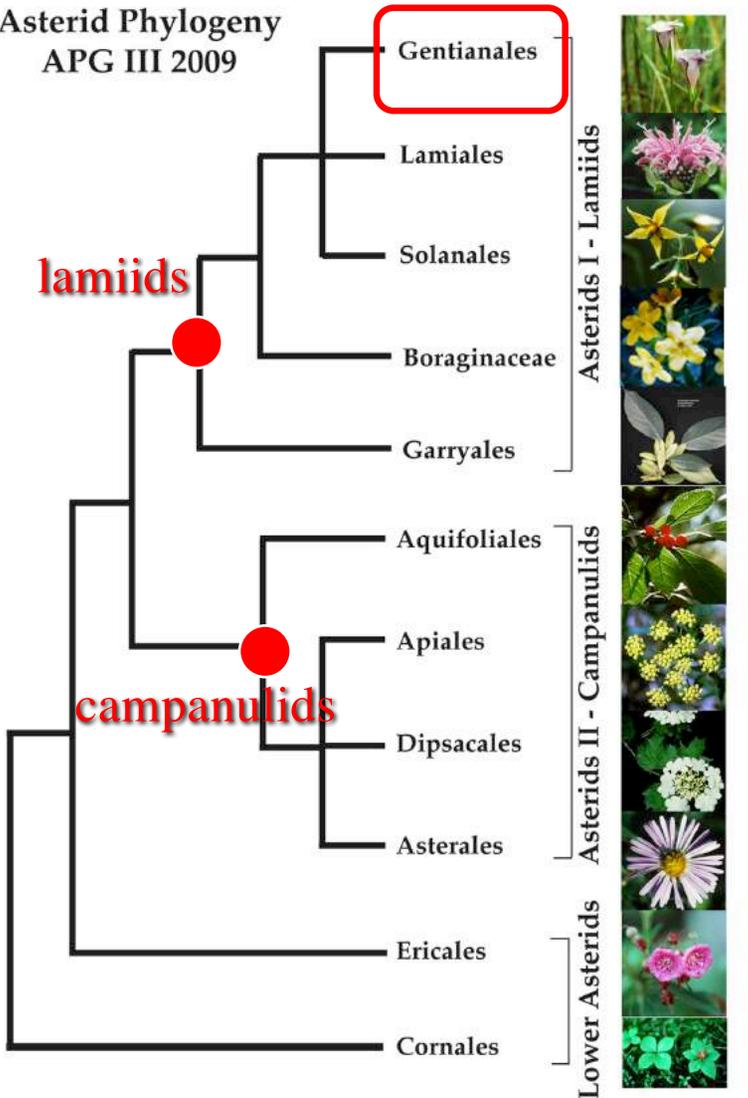


Anchusa, Boraginaceae

late

Gentianales

Asterid Phylogeny
APG III 2009



- order within ‘lamiid’ or Asterid I group
- 5 families and nearly 17,000 species dominated by **Rubiaceae** (coffee) and **Apocynaceae** (milkweed)
- iridoids, opposite leaves, contorted corolla

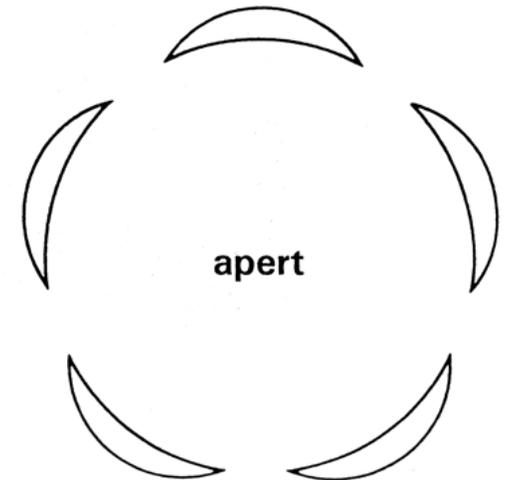
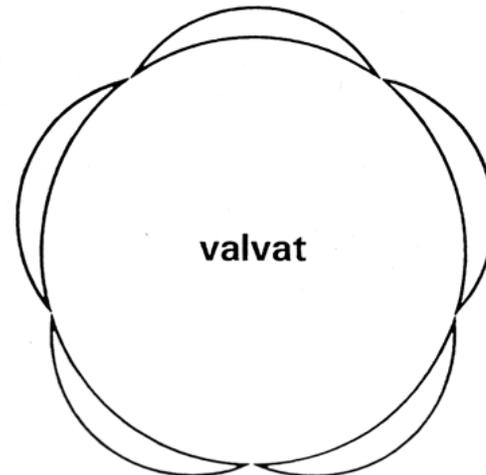
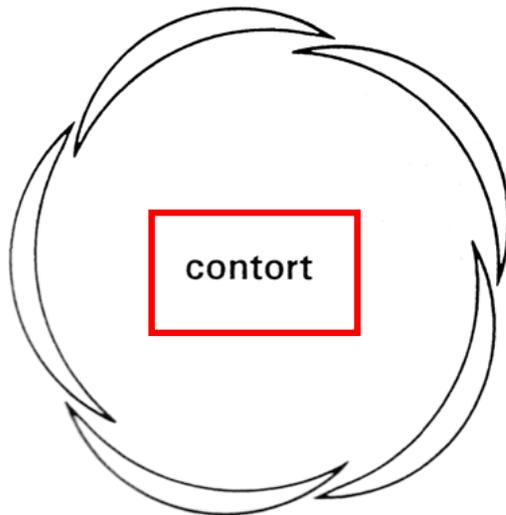
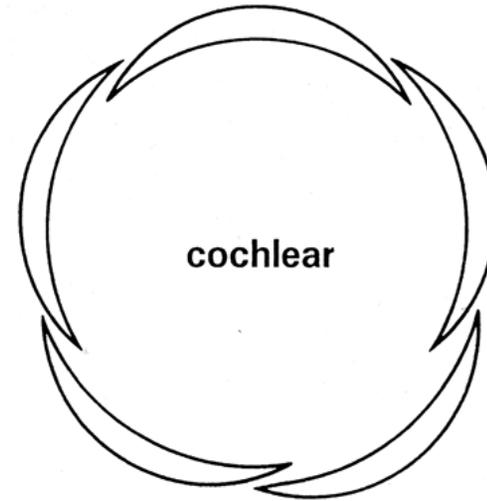
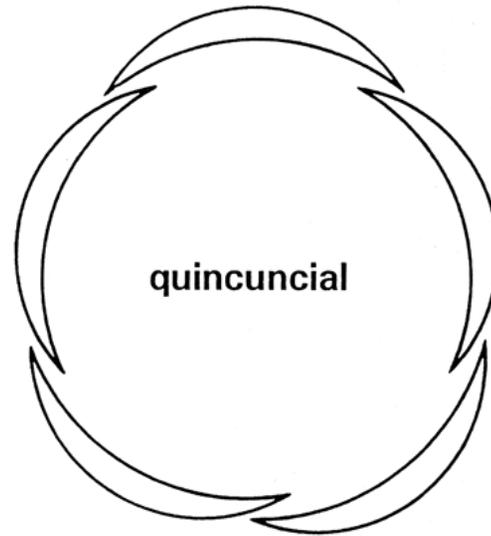
Rubiaceae



Apocynaceae



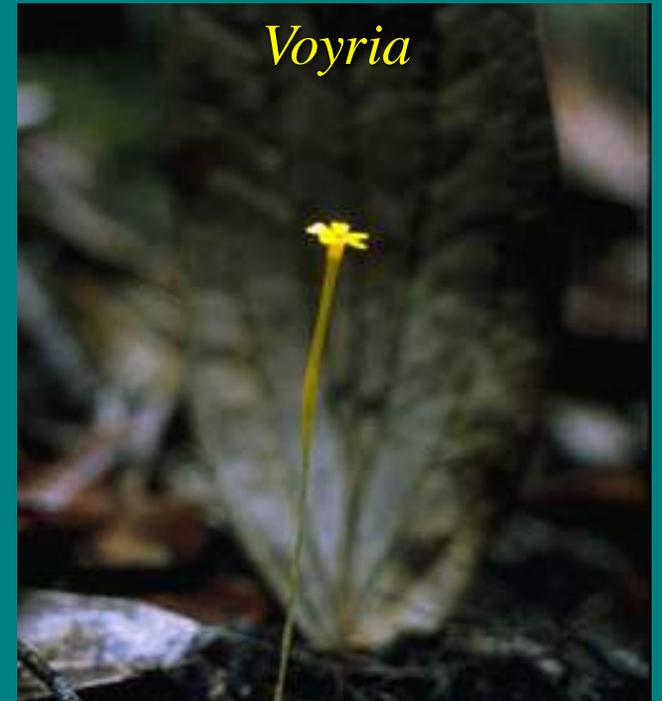
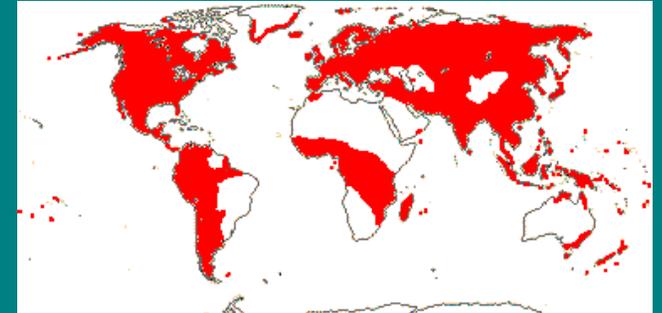
Gentianales



corolla aestivation

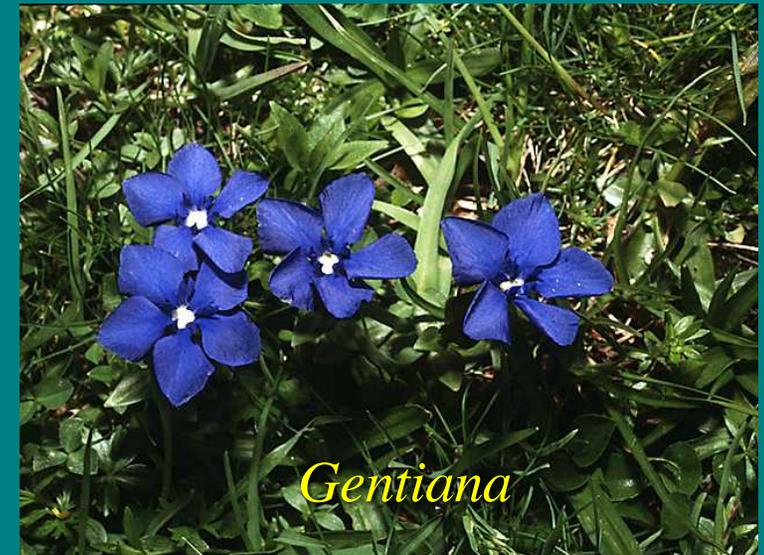
*Gentianaceae - gentians

Cosmopolitan family of 87 genera and nearly 1700 species. Herbs to small trees (in the tropics) or mycotrophs.



*Gentianaceae - gentians

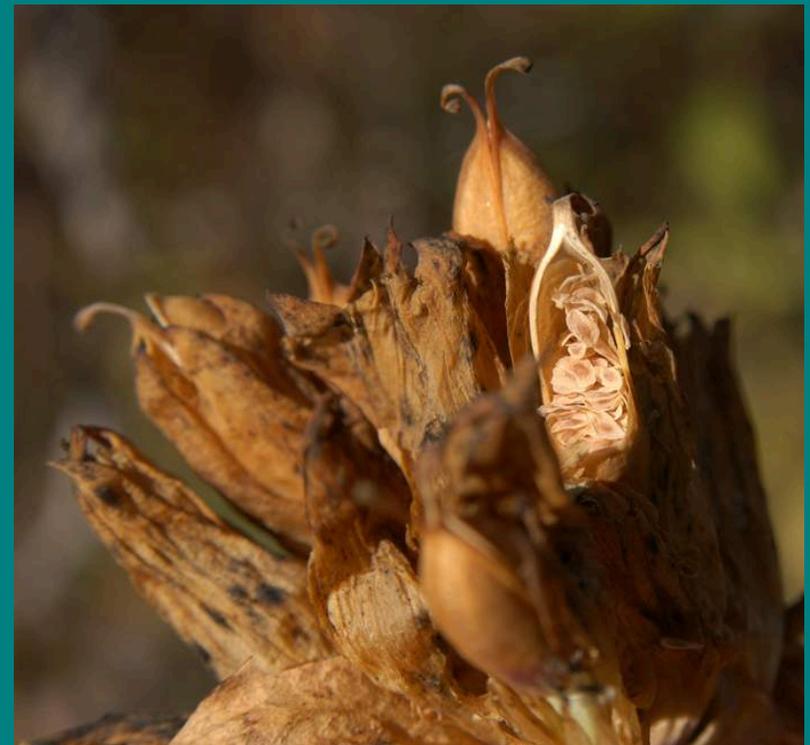
- opposite leaves
- glabrous - no hairs!
- flowers right contorted



*Gentianaceae - gentians

CA (4-5) CO (4-5) A 4-5 G (2)

- flowers 4 or 5 merous
- pistil superior of 2 carpels
- **parietal** placentation; fruit capsular



*Gentianaceae - gentians

Gentiana is 5 merous, with plaits between each petal lobe



Gentiana andrewsii -
Bottle gentian



Gentiana puberulenta -
Prairie gentian

*Gentianaceae - gentians

Gentianopsis is 4 merous, with fringed petals



Gentianopsis procera - fringed gentian



Gentianopsis crinita -
fringed gentian

*Gentianaceae - gentians

Gentianella is 4-5 merous, without fringe, and without plaits between petal lobes



Gentianella quinquefolia - stiff gentian

*Gentianaceae - gentians

- woody gentians common in cloud forests of the Neotropics
- hummingbird, bat, and bee pollinated radiations



Symbolanthus



Lisianthus



*Apocynaceae - milkweeds

Worldwide family of trees, vines, herbs with opposite leaves - 415 genera, 4600 species.



Pachypodium



Periploca

* Apocynaceae - milkweeds

Worldwide family of trees, vines, herbs with opposite leaves - 415 genera, 4600 species.

Vinca minor - periwinkle
Introduced ground cover,
often spreading



Caralluma europea
cactus mimic



Asclepias syriaca
common milkweed

*Apocynaceae - milkweeds

Milky latex commonly **poisonous** and source of medicinal drugs.



Catharanthus roseus
Malagasy periwinkle



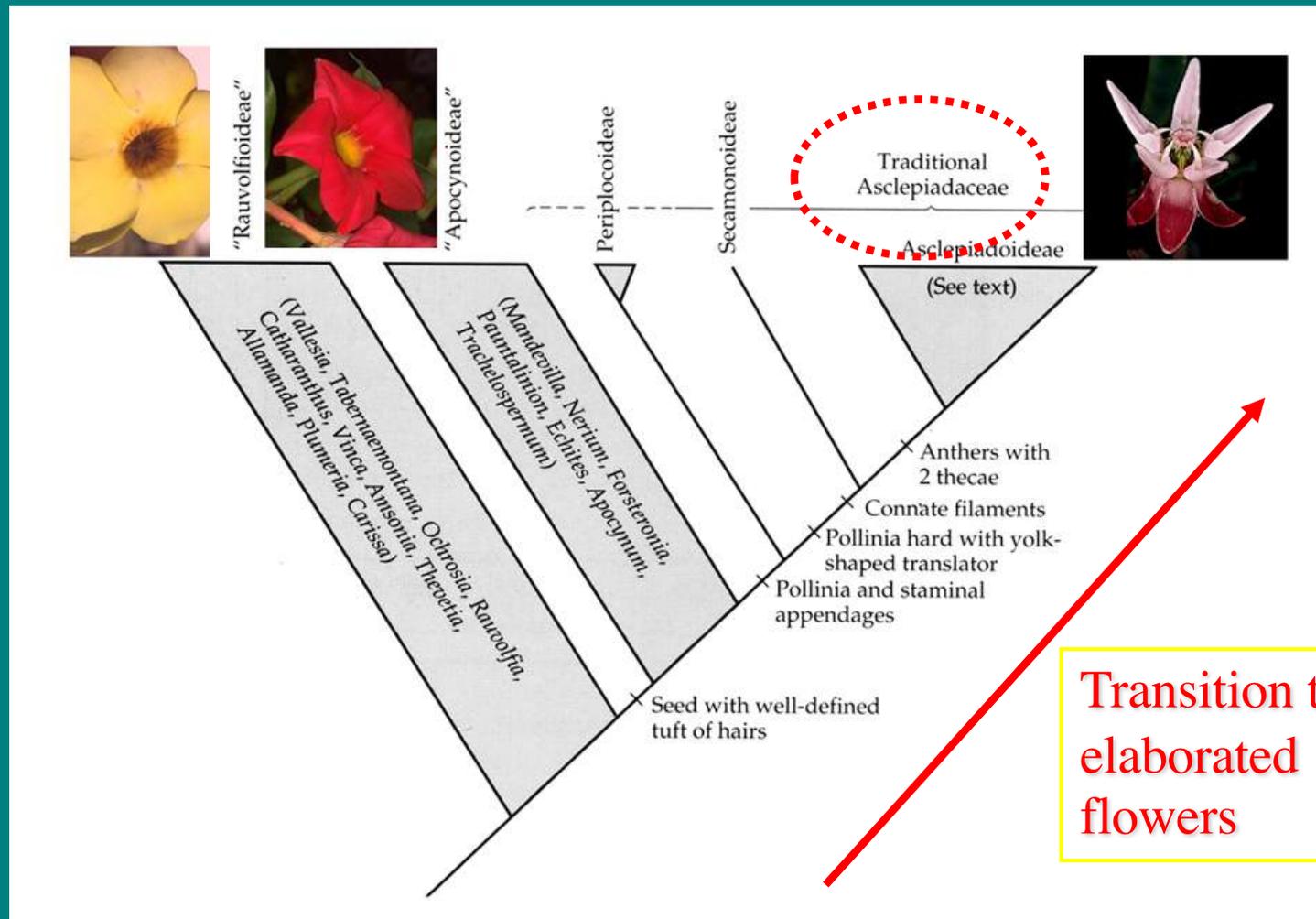
Asclepias & monarch
cardiac glycosides



Curare vine - South America

*Apocynaceae - milkweeds

Family is broadly defined and includes distinctive milkweeds of old family *Asclepiadaceae*



*Apocynaceae - milkweeds

CA (5) CO (5) A 5 G 2

primitive

- flowers 5 merous
- left contorted perianth
- 2 separate carpels - follicles



*Apocynaceae - milkweeds

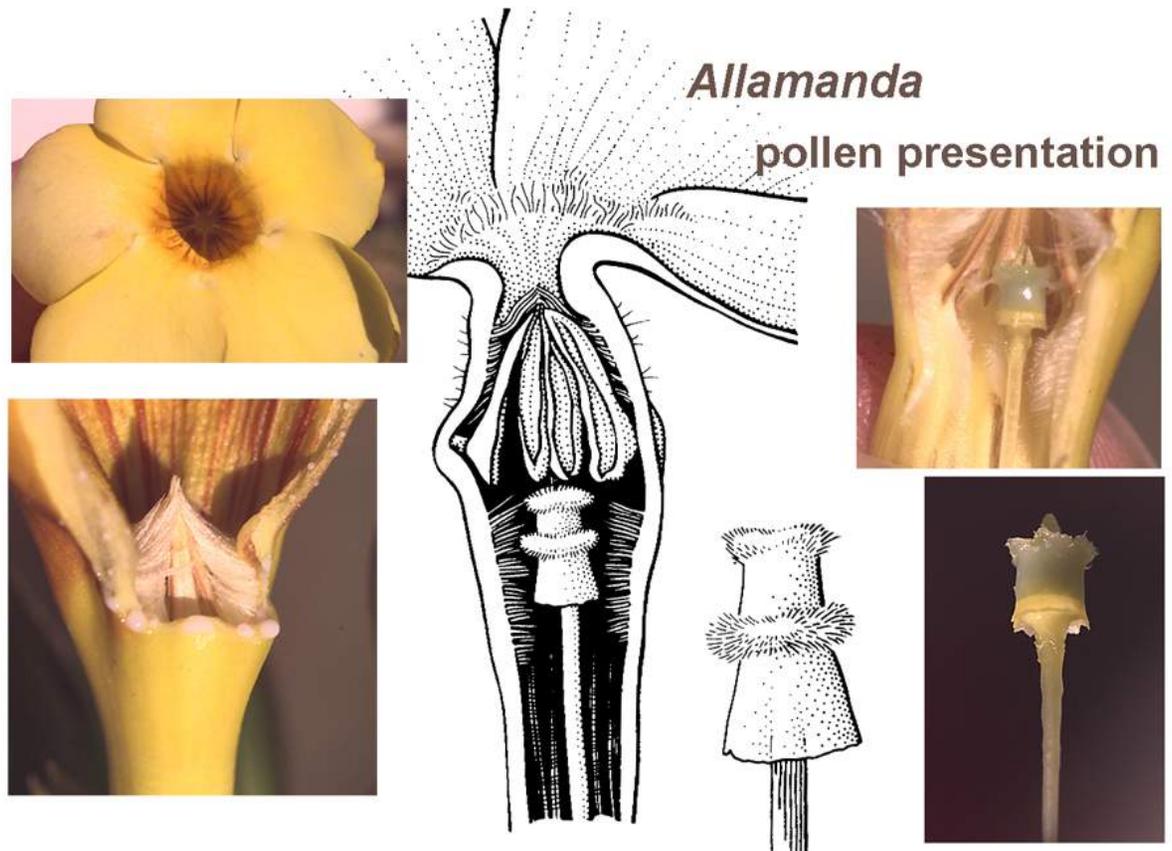
CA (5) CO (5) A5 G 2

primitive

- ‘**pollen presentation**’ - style plunger or bottle brush to expose pollen (important! part of the suite of features in Asterid “heads” or pseudanthia)



- 5 stamens begin to be **connivent**



*Apocynaceae - milkweeds

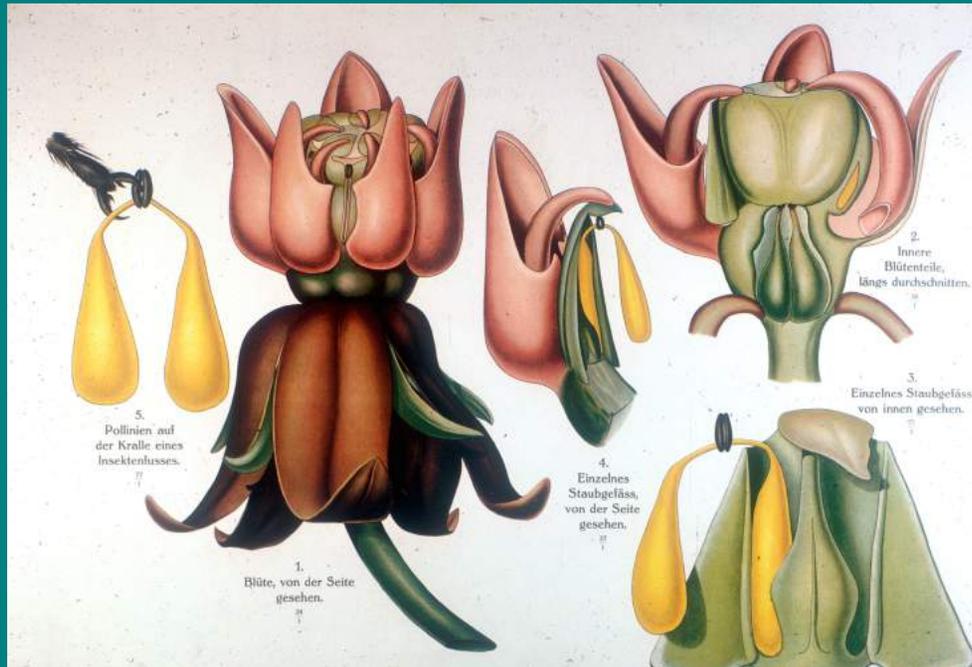
CA (5) CO (5) A (5) G 2

derived

- stamens fuse to each other and to style region - **gynostegium**
- pollen forms **pollinia**
- more seeds with **tufts of hairs**

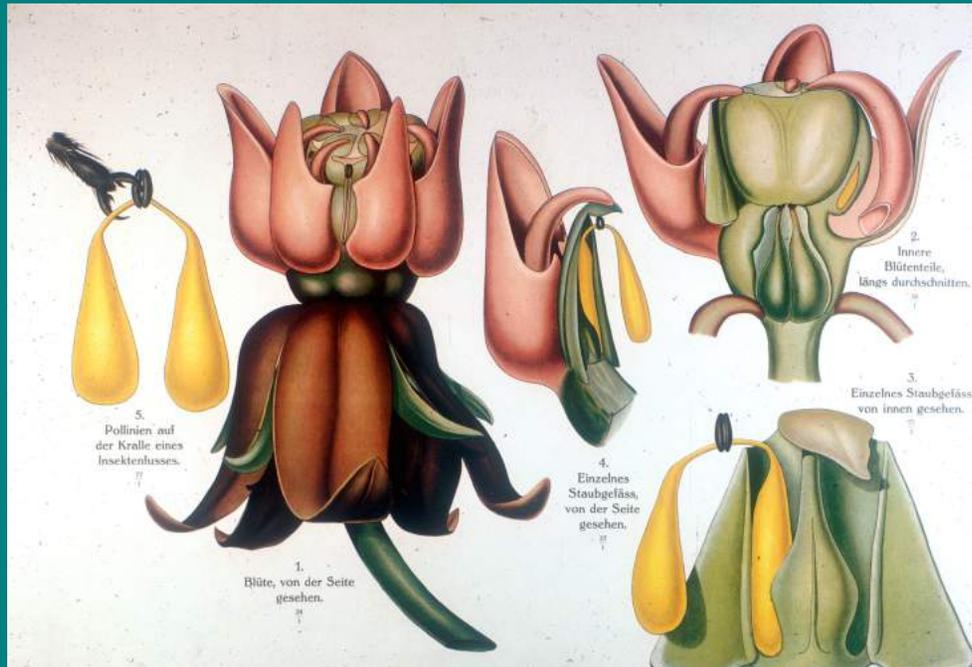


*Apocynaceae - milkweeds



Note 2 free carpels slightly fused at top

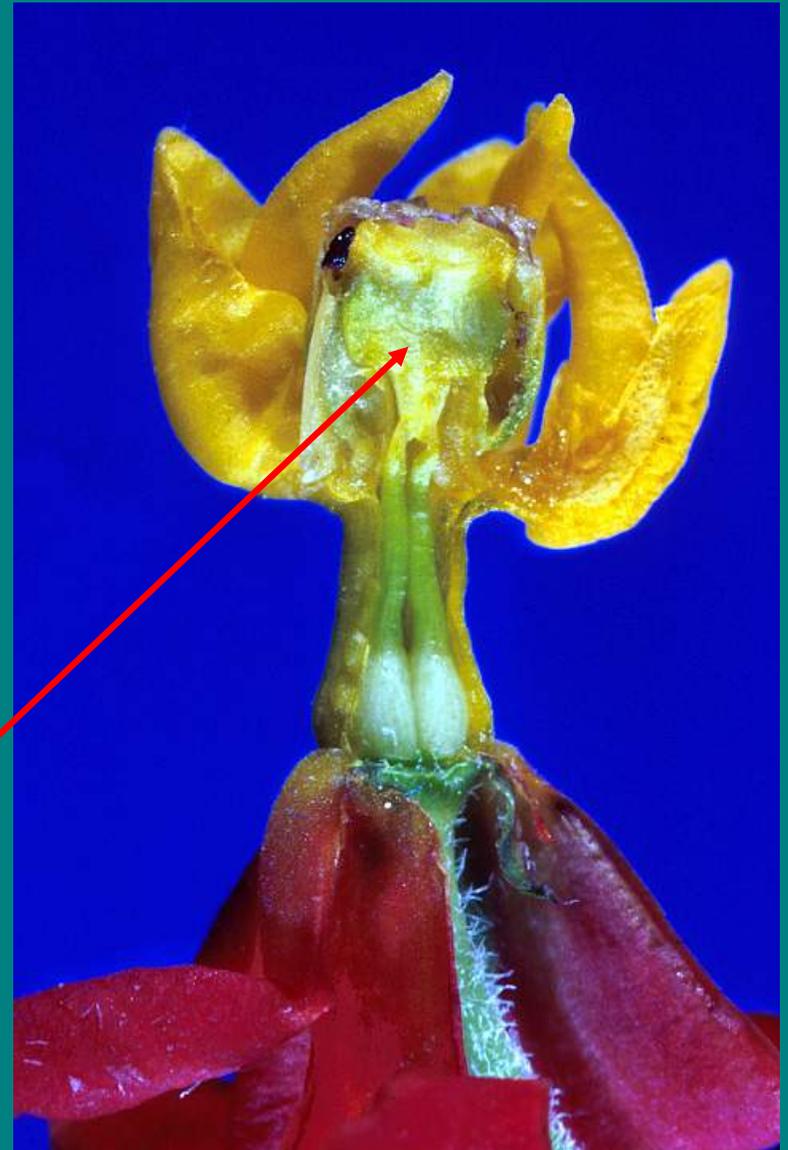
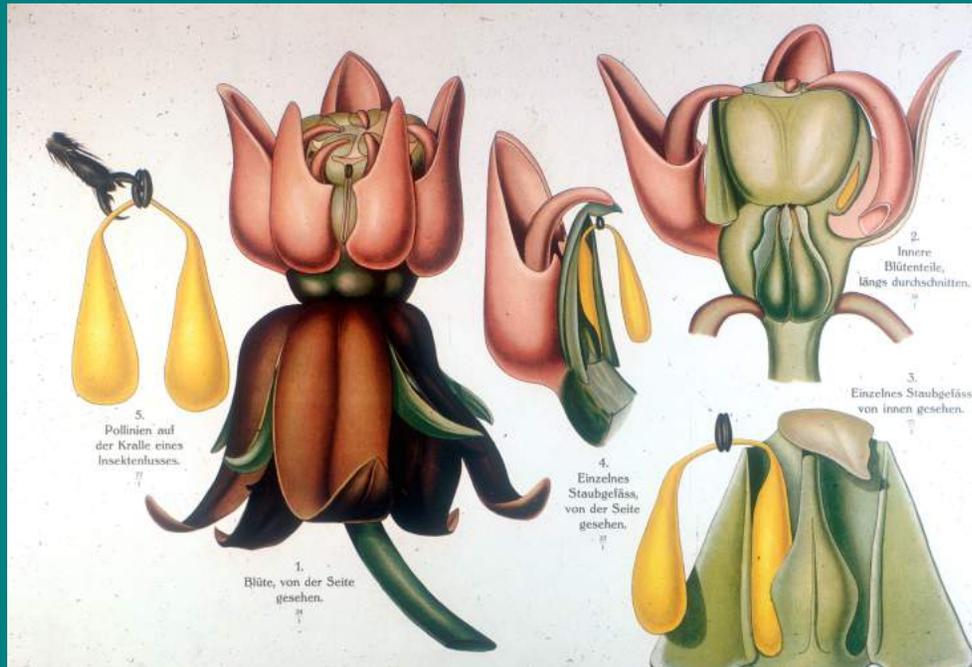
*Apocynaceae - milkweeds



Corona for nectar reward

Corona = hood + crest

* Apocynaceae - milkweeds

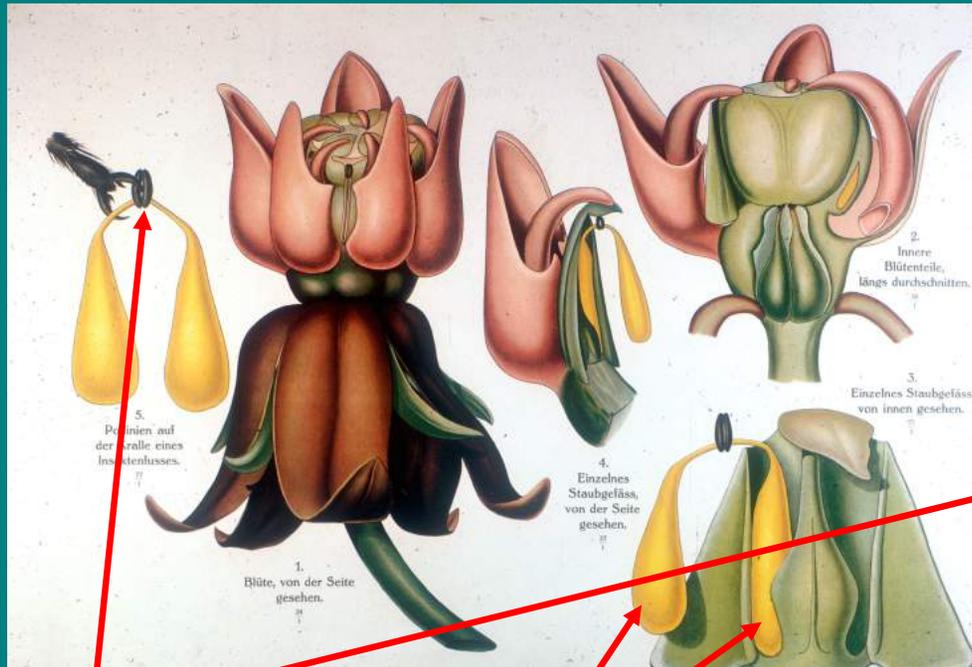


Fusion of 5 stamens and top of gynoecium

Corona = hood + crest

Gynostegium = A + G

* Apocynaceae - milkweeds



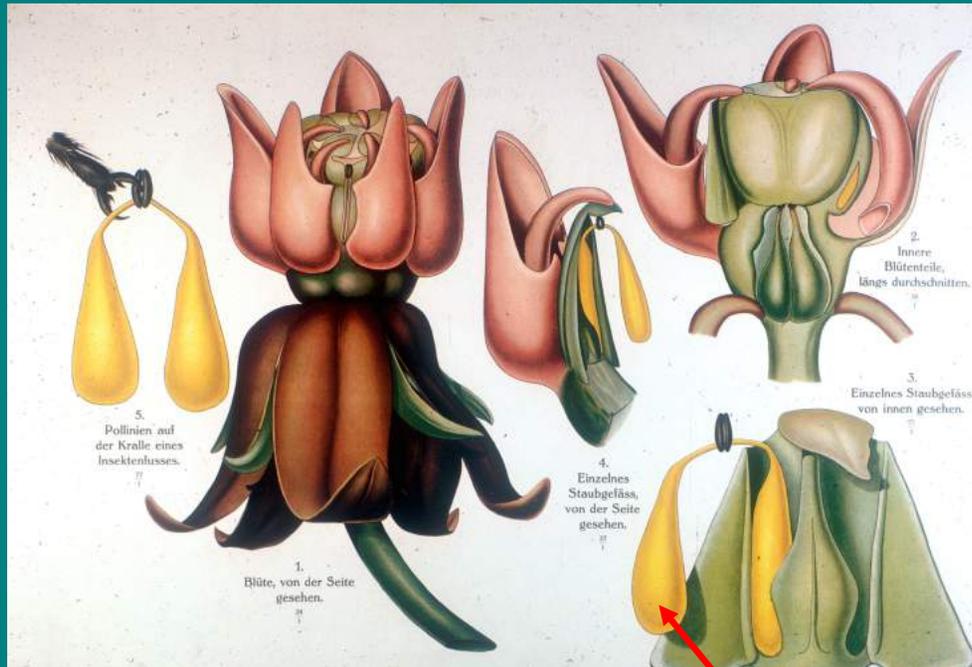
Gland is attached to 2 pollinia

Corona = hood + crest

Gynoestegium = A + G

Pollinia = pollen mass

* Apocynaceae - milkweeds



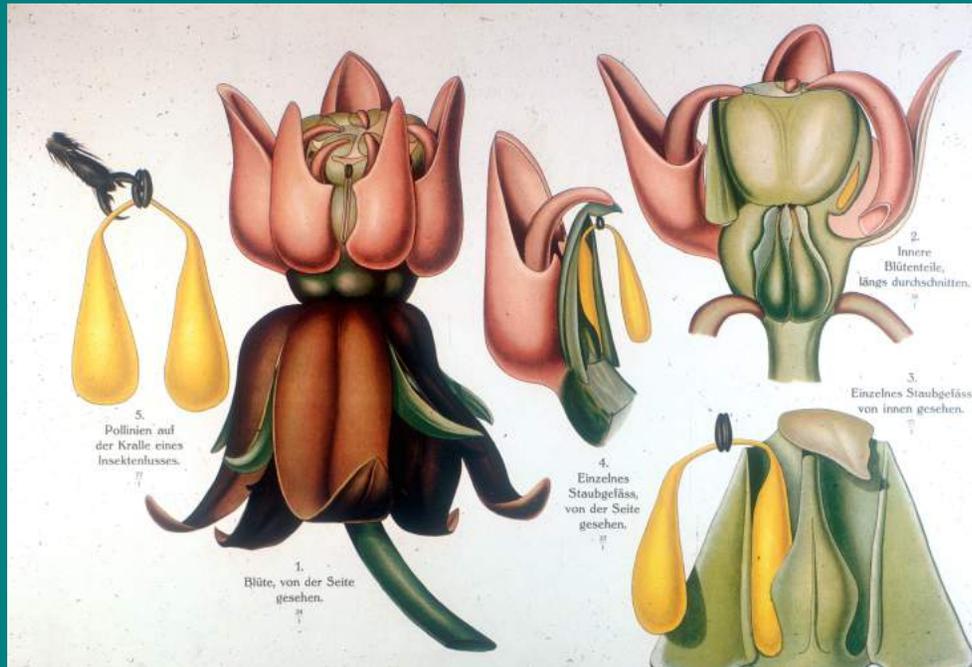
Gland is attached to 2 **pollinia**

Corona = hood + crest

Gynoestegium = A + G

Pollinia = pollen mass

*Apocynaceae - milkweeds



Bee removing pollinia or inserting pollinia into stigmatic cleft



*Apocynaceae - milkweeds

“Las Vegas” strategy of pollination; but when occurs, all ∞ ovules are fertilized. Typically few follicles are produced per plant. Note seeds with coma attached for wind dispersal.



Asclepias amplexicaulis - Clasp milkweed

*Apocynaceae - milkweeds



Apocynum androsaemifolium
Spreading dogbane



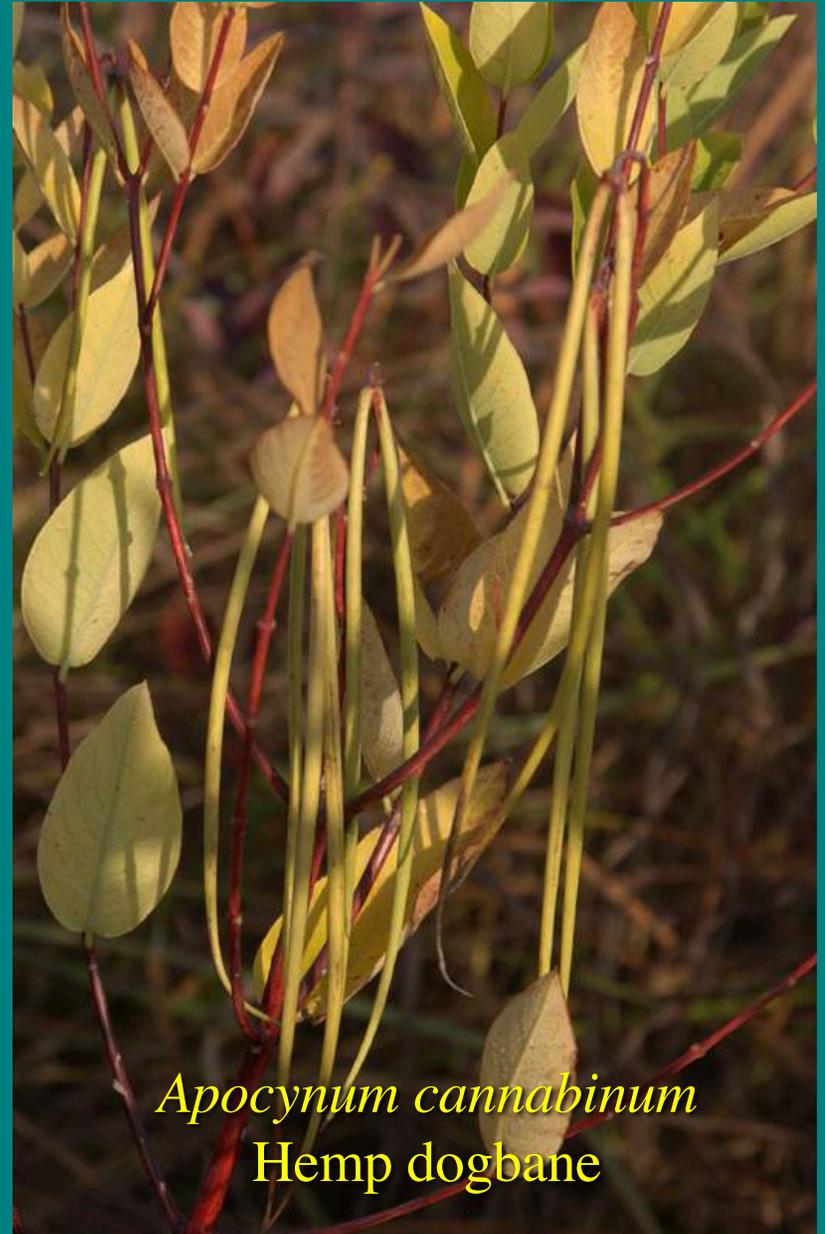
Apocynum cannabinum
Hemp dogbane



*Apocynaceae - milkweeds



Apocynum androsaemifolium
Spreading dogbane



Apocynum cannabinum
Hemp dogbane

*Apocynaceae - milkweeds



Asclepias syriaca - Common milkweed



Asclepias tuberosa - Butterfly weed



Asclepias incarnata - Swamp milkweed

*Rubiaceae - coffee

Cosmopolitan family, most diverse in tropics, of 550 genera and over 10,000 species

- trees, shrubs, lianas, and herbs
- important drug family

Psychotria nervosa



Houstonia caerulea -
azure bluets



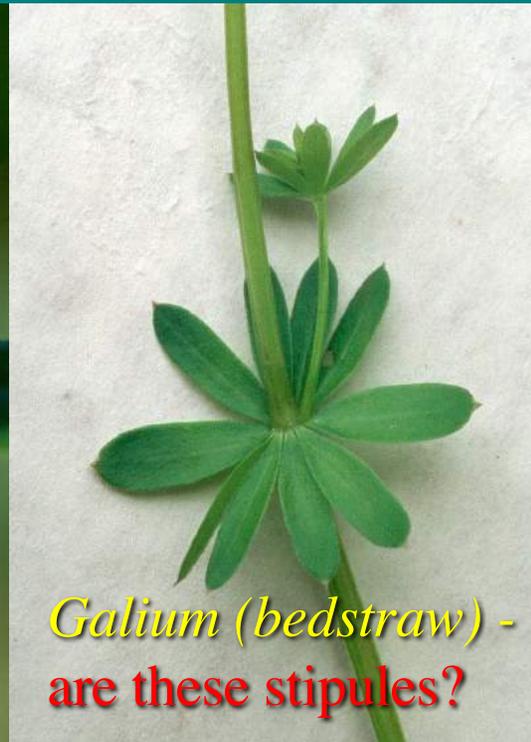
Cinchona -
quinine

Cinchona pubescens
Rubiaceae
© H. Lamoureux

*Rubiaceae - coffee

Cosmopolitan family, most diverse in tropics, of 550 genera and over 10,000 species

- **opposite** (whorled) leaves with **inter-petiolar stipules**



Galium (bedstraw) -
are these stipules?



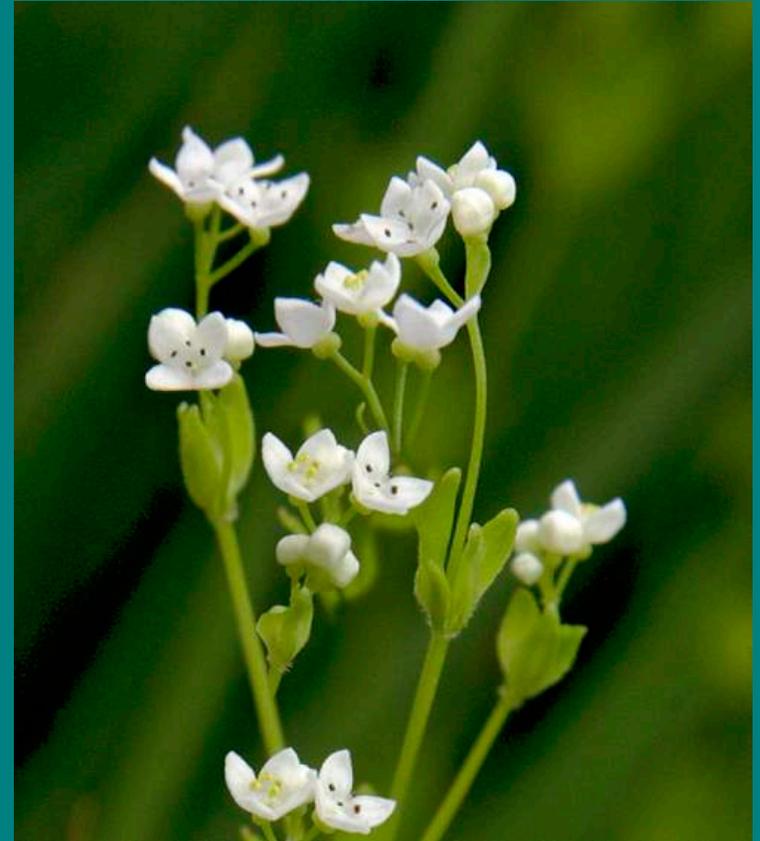
*Rubiaceae - coffee

CA (4-5) CO (4-5) A 4-5 $\overline{G(2)}$

- 4 merous in temperate regions, 5 merous in tropics - tendency to **cluster (pseudanthia!)**
- only **epigynous** family in Gentianales
- fruit usually a 2-seeded drupe



Pentagonia
Panama



Galium - bedstraw
Wisconsin

*Rubiaceae - coffee



Galium aparine - cleavers

Cleavers and bedstraws are numerous; separated by number of whorled leaves and fruit type

*Rubiaceae - coffee



Houstonia caerulea- azure bluets

*Rubiaceae - coffee



Mitchella repens
Partridge berry, twin-berry

Note: paired flowers above
with connate pistils;
“twin” berry to right



*Rubiaceae - coffee



Cephalanthus occidentalis - buttonbush

Only shrub in Wisconsin; note “heads” of tiny 4 merous flowers
“pseudanthia”



*Rubiaceae - coffee



Isertia



Coffea arabica -
coffee

*Rubiaceae - coffee



Psychotria nervosa



Cephaelis tomentosa
hotlips

- the giant genus *Psychotria* is paraphyletic and includes more specialized genera (e.g., condensed, bracted inflorescences) “**pseudanthia**”!

*Rubiaceae - coffee



Psychotria nervosa



Sally Kellerman
Hot Lips Hoolihan

- the giant genus *Psychotria* is paraphyletic and includes more specialized genera (e.g., condensed, bracted inflorescences)

*Rubiaceae - coffee



Hydnophytum formicarum

(in greenhouse #4)

The genus *Hydnophytum* - ant plants and epiphytes - along with the whole subtribe Hydnophytinae - are now shown to be derived out of the genus *Psychotria*!

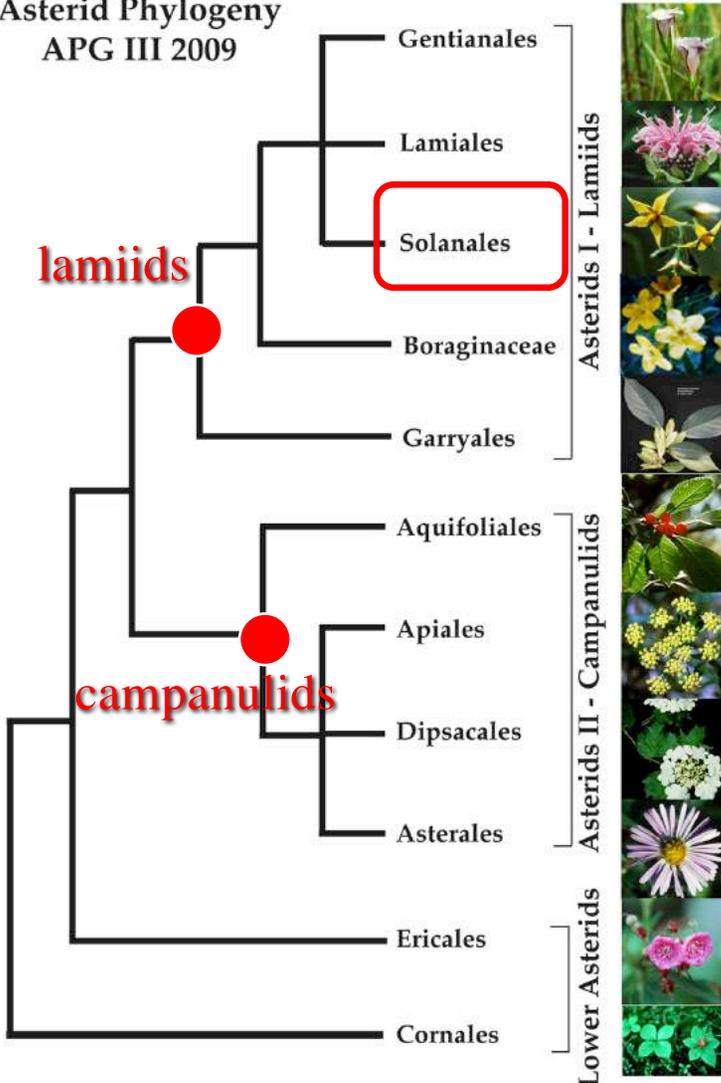


©M. Monnier

Solanales

- order within ‘lamiids’ or Asterid 1 group
- 5 families and nearly 5,000 species dominated by **Solanaceae** (nightshade) and **Convolvulaceae** (morning glory)
- no iridoids, alternate leaves, plicate corolla, calyx persistent in fruit

Asterid Phylogeny
APG III 2009



Solanaceae



Convolvulaceae



*Solanaceae - nightshades

Large cosmopolitan family of herbs, shrubs, or trees with nasty compounds. Important for source of foods (potato, tomato, pepper) and drugs.

- Alternate leaved
- Cyme or dichasium inflorescence



*Solanaceae - nightshades

CA (5) CO (5) A 5 G (2)

- 5- merous flowers
- axile placentation
- berry fruited



Capsicum - pepper



Solanum dulcamara
Bittersweet



Solanum carolinense -
Horse nettle

*Solanaceae - nightshades

CA (5) CO (5) A 5 G (2)

- stamens often **terminal pored** for buzz pollination by bees (remember Ericaceae?)



Solanum carolinense -
Horse nettle



*Solanaceae - nightshades

CA (5) CO (5) A 5 G (2)

- often calyx persistent in fruit



Physalis alkekengi - Japanese lantern

*Solanaceae - nightshades

Botany 400 collections species!

Solanum dulcamara - bitterweet



*Solanaceae - nightshades



Solanum carolinense - Horse nettle

*Solanaceae - nightshades



Physalis virginiana

Ground cherry

Note: calyx surrounding berry



*Solanaceae - nightshades

edible fruits include . . .

Capsicum - pepper

Solanum - tomato & eggplant



*Solanaceae - nightshades

drug plants include . . .

Atropa belladonna



*Solanaceae - nightshades

drug plants include . . .



Nicotiana tabacum

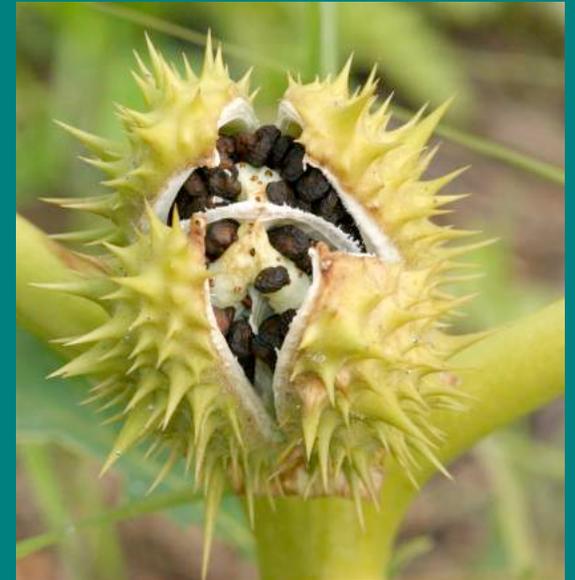
Atropa belladonna

Brugmansia

Datura stramonium



*Solanaceae - nightshades



Introduced,
hallucinogenic roadside
weed

Datura stramonium
Jimson-weed

. . . also called
thorn-apple



*Solanaceae - nightshades



Introduced,
hallucinogenic roadside
weed

Datura stramonium
Jimson-weed

. . . also called
thorn-apple

CASE REPORT

Jimson Weed Intoxication in Five Adolescents

Steven N. Soneral, DO; Neil P. Connor, MD

INTRODUCTION

Datura stramonium (jimson weed) is a poisonous shrub that grows wildly throughout the United States with a high potential for abuse. The plant possesses potent anticholinergic properties, and ingestion can cause serious illness or death. Intentional ingestions may result in unintended poisonings for people who attempt to experience the anticholinergic-induced delirium that typically manifests after ingesting the leaves, stem, seeds, or tea brewed from the leaves. We report 5 cases of *D. stramonium* intoxication seen within a 3-day span as well as recent data regarding anticholinergic plant exposures.

Wisconsin Medical Journal 2005

*Solanaceae - nightshades



Introduced,
hallucinogenic roadside
weed

Datura stramonium
Jimson-weed

. . . also called
thorn-apple

Case 3

A 16-year-old male presented with slurred, unintelligible speech and severe restlessness. Blood pressure was 130/67, and pulse was 85 beats per minute. Activated charcoal was administered. Shortly after admission to the PICU, he became aggressive, combative, and even attempted to stand on a bedside table and fly to escape from the room. Subsequently, he was sedated with intravenous lorazepam. Discharge occurred after 24 hours with normal vital signs and mental status.

Case 4

A 15-year-old male was brought to the ED by the police after he had been found crawling down a busy street into an intersection. He was picking at objects on his body that were not present. His only comprehensible words were obscenities. Blood pressure was 119/44, and pulse was 154 beats per minute. Skin was dry and flushed. Urine toxicology screen was negative. Activated charcoal was administered. Blood pressure and temperature remained stable. Pulse ranged from 40 to 109 beats per minute with sinus rhythm. He was sedated as necessary and discharged 40 hours later with normal vital signs and mental status.