

Paracou research station, Presentation & Capacity Building, Novembre 2015

Main botanical families from the Guiana shield

Patrick Heuret

patrick.heuret@ecofog.gf



(1) UMR Ecofog
Ecologie des forêts de Guyane
Kourou, Guyane Française



WARNING

This course material is designed to be accompanied by verbal explanations.

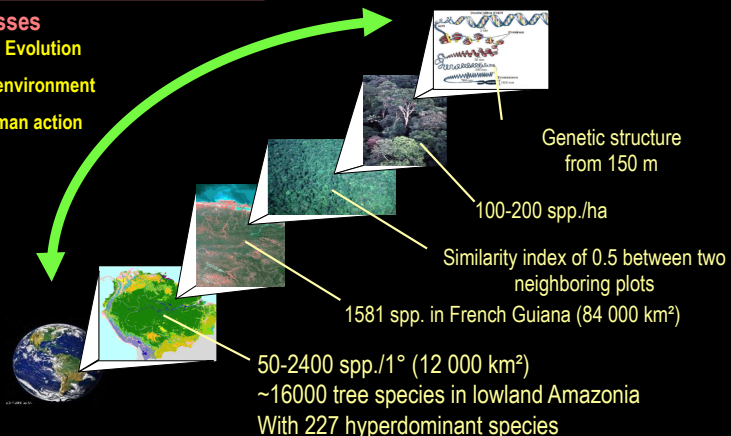
If you did not attend the presentation, the reading of the slides may lead you to misinterpretations

The biodiversity of tropical forests:

The example of forest trees

Processes

- History, Evolution
- Actual environment
- The human action



Taxonomy and the level of the family

- **Taxonomy** : Science of classification of living things
- **Systematic** : Broader term covering all aspects of the study of diversity, including evolutionary aspect

Phylum (Spermaphyte)

Class (Dicotylédones)

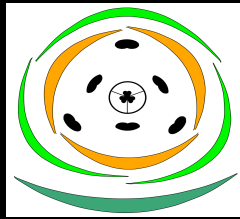
Order (Malvales)

Family (Caricaceae)

Genus (Carica)

Species (papaya)

Taxonomy and the level of the family

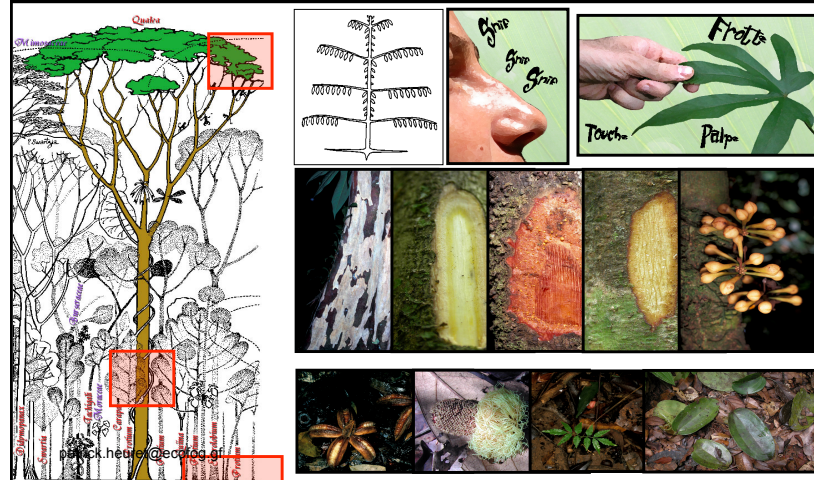


After Linnée :
The classification is based on the flower
Numerous revisions with molecular approached

Concretely on the field:

- Flowers to 40m high
- Some criterias are unobservable on the field
- The seasonality
Database Guyadiv (IRD) – 58 ha inventoried (dbh > 10cm)
~ 63 000 trees -> 700 trees in flower/fruit (1.1 %)

Taxonomy and the level of the family



Identify botanical families on the basis of morphological criterias



Types of leaves
Simple or compounds



Phyllotaxy

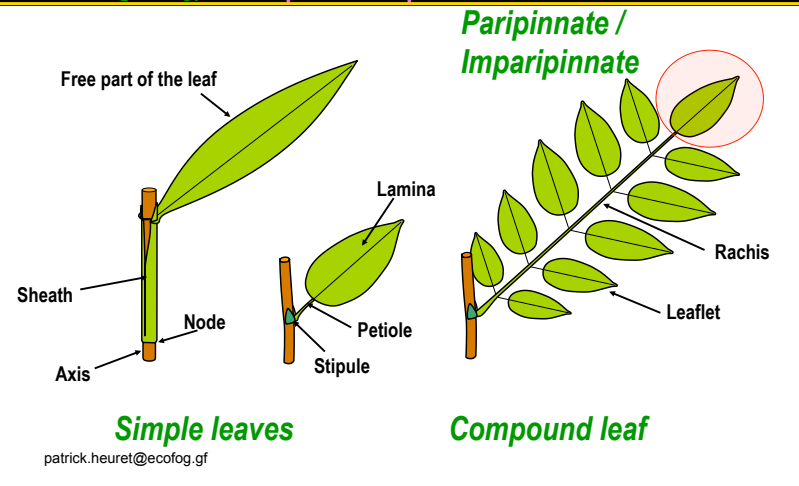


Exudates (latex, gums, resins, ...)



Stipules

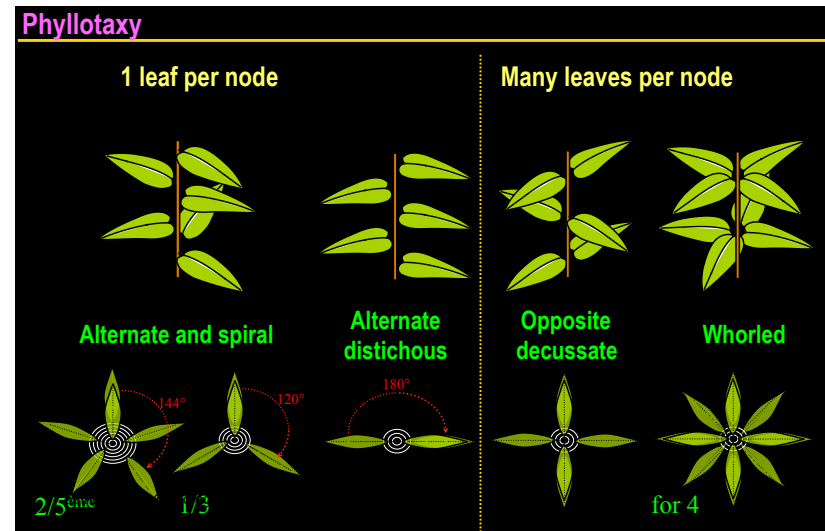
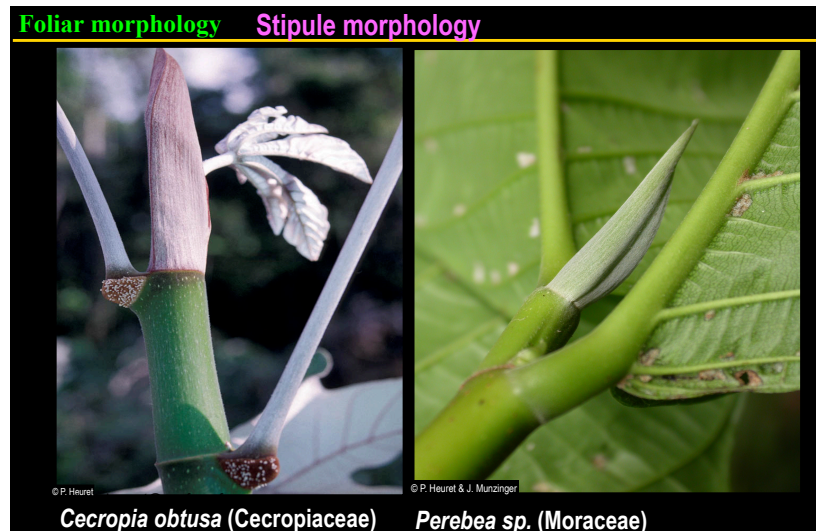
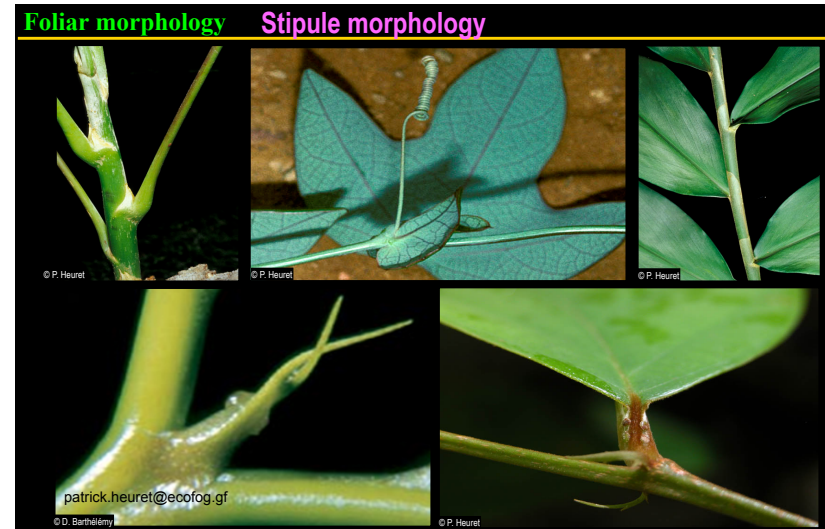
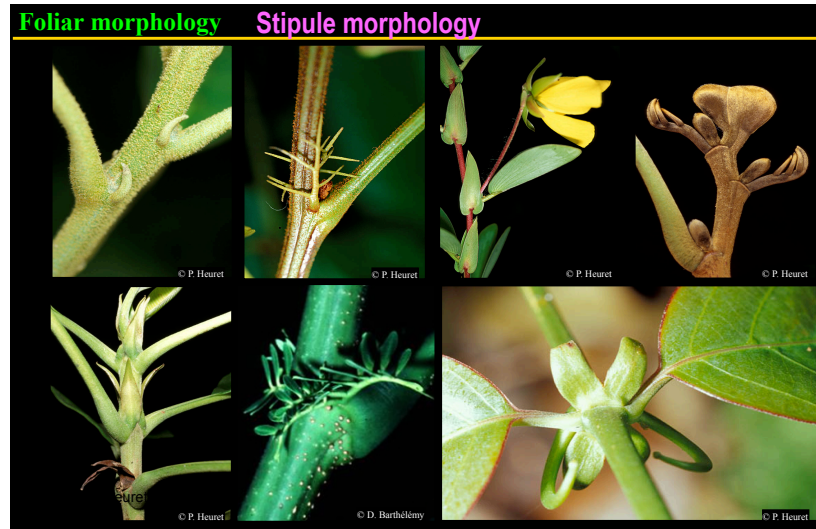
Foliar morphology Simple or compound leaves



Simple leaves

Compound leaf

patrick.heuret@ecofog.gf



Exudates : Resin, Kino, Gums, Latex

Latex is a colloidal suspension or emulsion of water-insoluble substances, suspended in an aqueous phase, which may be released on cutting the bark. It is typically white (milky), but may be yellow to red, or colorless. It is produced in specialized internal secretory structures known as laticifers.



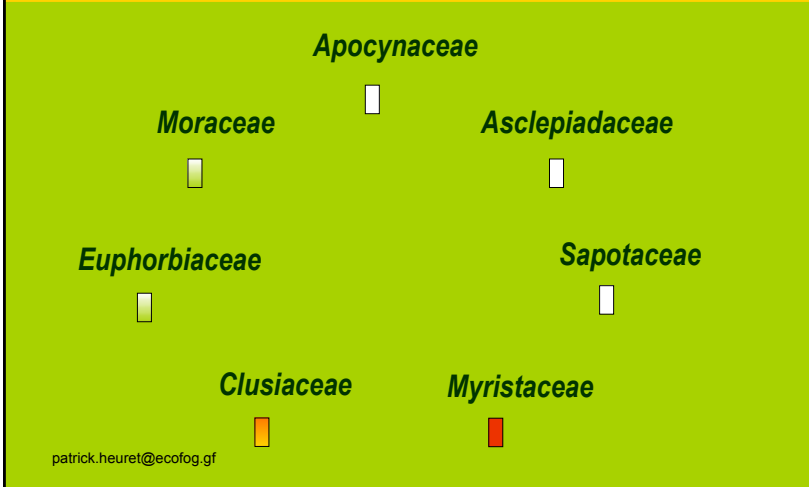
Exudates : Resin, Kino, Gums, Latex



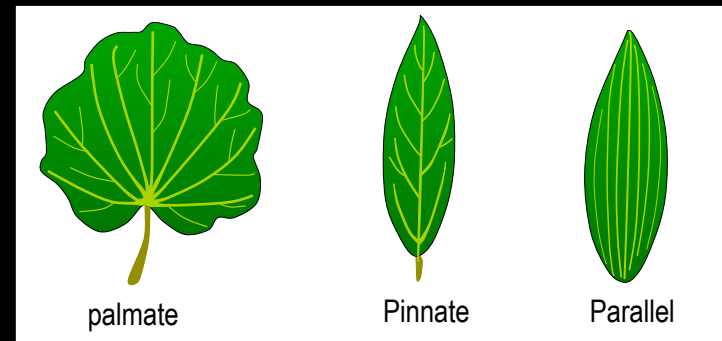
(Burseraceae)

(Dipterocarpaceae)

Exudates : Latex, color and families



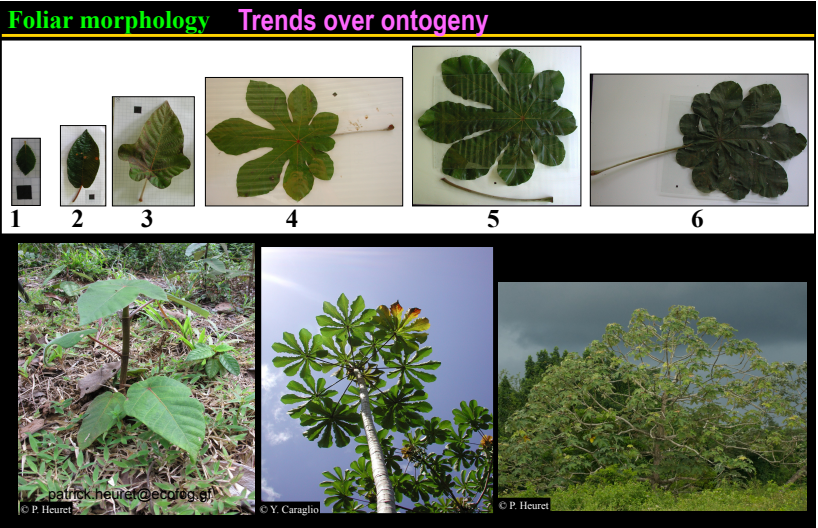
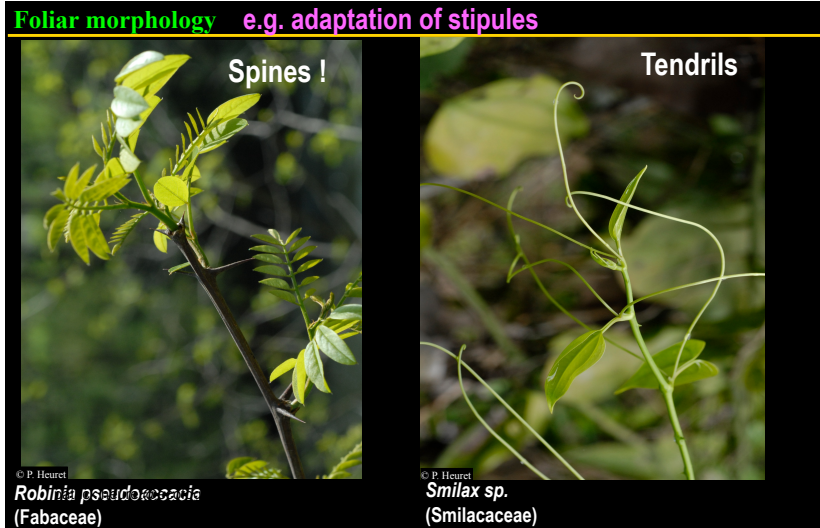
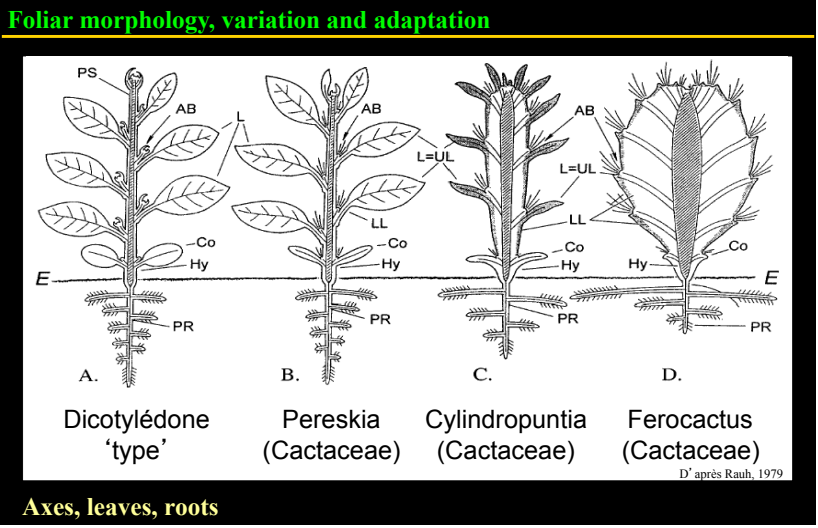
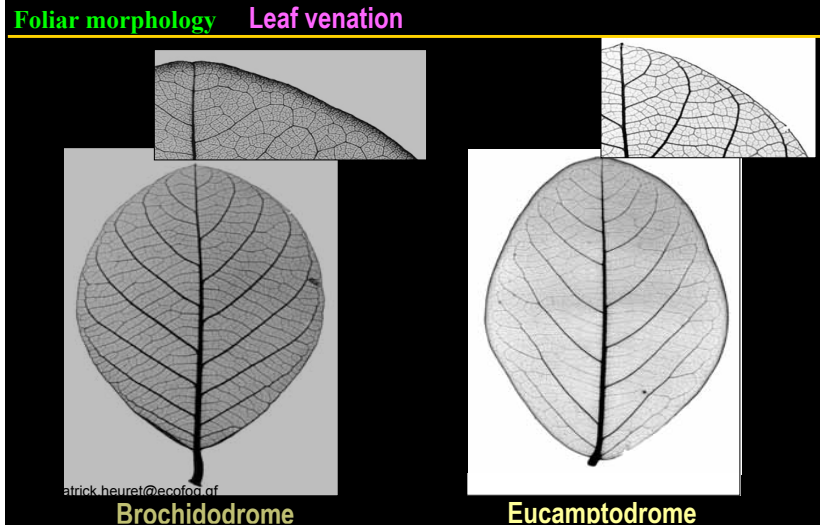
Foliar morphology Leaf venation



palmate

Pinnate

Parallel



Xper2, IDAO Project Multi-entry Keys

French Institute of Pondicherry - Our web version: Mozilla Firefox

Le plus vite: Colabor avec Firefox... A la une: Microsoft Exchange... http://www.ecofog.fr/

French Institute of Pondicherry

CONTROLS

- COMPUTE
- NEW SELECTION
- SPECIES LIST
- HELP
- ABOUT
- EXIT

Species Match:
00 species @ 0%

patrick.heuret@ecofog.fr

Xper2, IDAO Project Multi-entry Keys

French Institute of Pondicherry - Our web version: Mozilla Firefox

Le plus vite: Colabor avec Firefox... A la une: Microsoft Exchange... http://www.ecofog.fr/

French Institute of Pondicherry

CONTROLS

- COMPUTE
- NEW SELECTION
- SPECIES LIST
- HELP
- ABOUT
- EXIT

Species Match:
1 species @ 100%

patrick.heuret@ecofog.fr

Xper2, IDAO Project Multi-entry Keys

Jaccard, Sokal & Michener

Cecropia [?]

Descriptions in progress

Filter by group: All groups

Best descriptor?

Presence of trichilia
Lamina: isolate
Number of segments (or main veins)
Lamina: segments: regular
Free part of the mid-segment: form (a)
Free part of the mid-segment: form (b)
Axe of the mid-segment: form
Lamina: upper surface?
Lamina: lower surface
Number of pairs of lateral veins of mid-segment
Lateral veins: type of connection?
Lateral veins: ramification?
Lamina: adaxial surface
Lamina: beneath: arachnoid indumentum in two distinct places?

Definitions

Lamina: segment inclusion
Petiole: The stalk of a leaf, its compound leaves, the stalk between the leaf attachment and the insertion of the first leaflets.

Remaining items: 61

Cecropia alabrac
Cecropia andrea
Cecropia angulata
Cecropia armulata
Cecropia bullata
Cecropia chlorostachya
Cecropia cuneolata
Cecropia elliptica
Cecropia engleriana
Cecropia floribunda
Cecropia gabrielis
Cecropia garberi
Cecropia glazouii
Cecropia goudotiana
Cecropia granulibana
Cecropia hartwegii
Cecropia heterochroma
Cecropia hirsutissima
Cecropia hololeuca
Cecropia ilicifolia
Cecropia imrayas
Cecropia karwinskiana
Cecropia latifolia
Cecropia leucocarpa
Cecropia longipes
Cecropia marginata
Cecropia missilliana

patrick.heuret@ecofog.fr

16 families, not so bad to begin

Abundances per families (% of trees)

Other (54 Families)

Lecythidaceae

Caesalpinaceae

Chrysobalanaceae

Papilionaceae

Sapotaceae

Annonaceae

Burseraceae

Meliaceae

Arecaeae

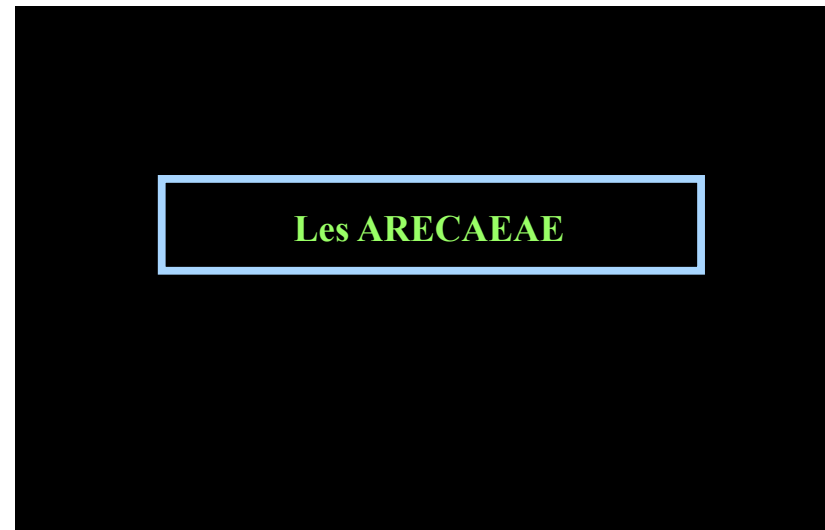
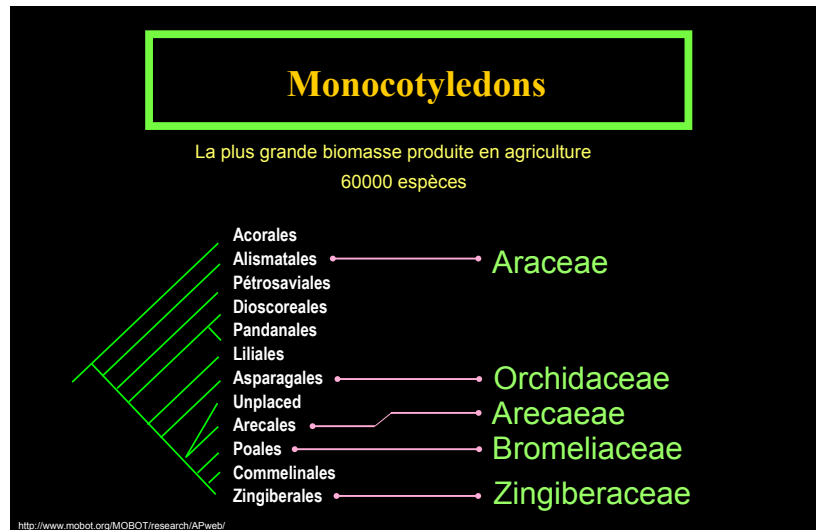
Apocynaceae

Mimosaceae

Papilionaceae

Autre (35 Families)

D'après Molino et al.



Les ARECAEAE – Vegetative characters

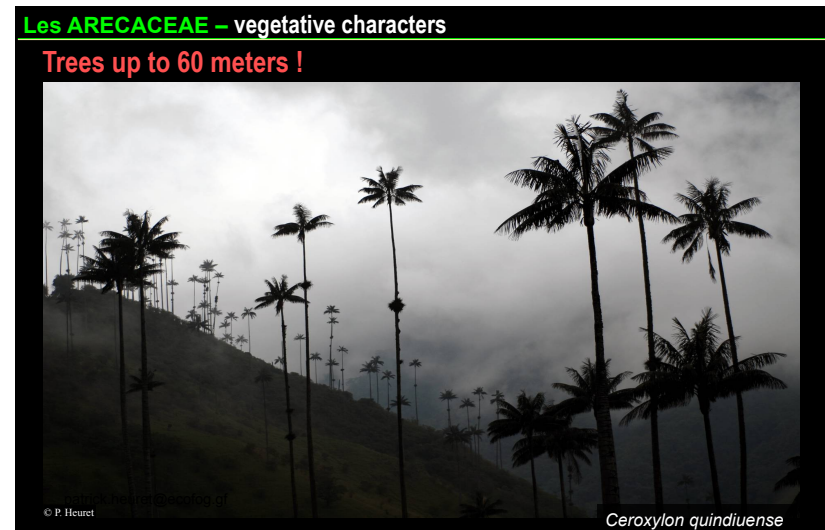
- The family of palms !
- Trees, shrubs, liana
- Composite leaves, palmate or pinnate
- Φ Alternate and spiral
- Mostly monocaulous...
- Architectural model of Holttum, Corner, Shoute
- Lignified stipe (no secondary growth)

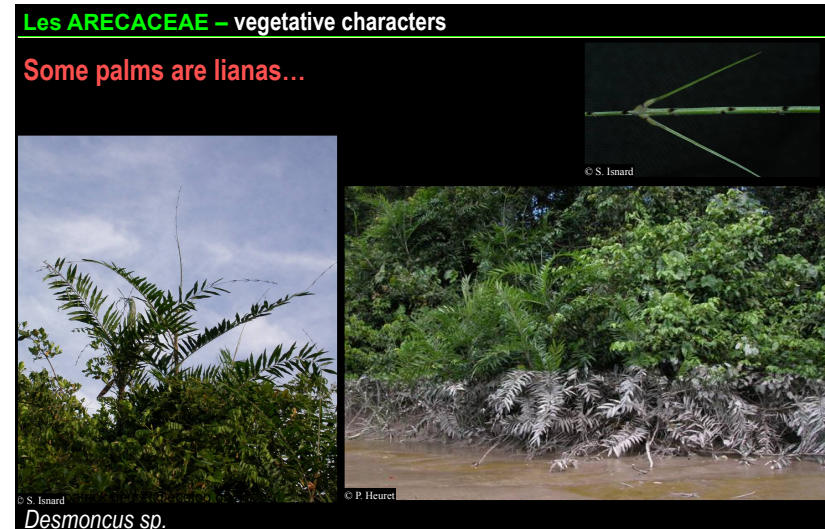
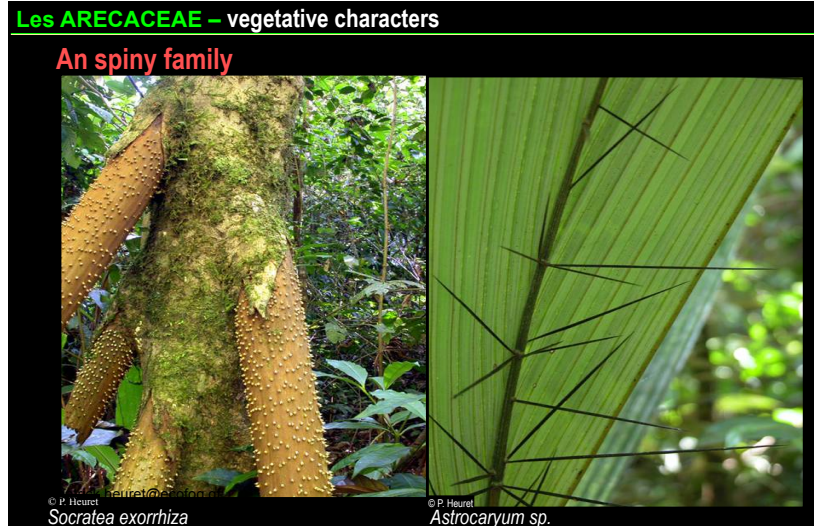
202 genus
2600 species

In French Guiana,
16 genres, 59 sp.
+ 5 varieties

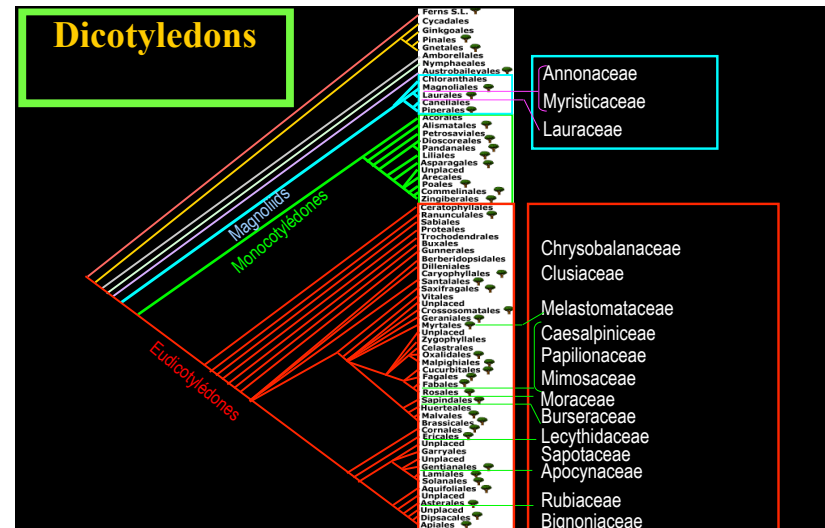
© P. Heuret

Bactris (18 sp.)
Geonoma (8 sp.)
Astrocaryum (8 sp.)
Attalea (6 sp.)





- Les ARECACEAE – Uses**
- **Food**
 - copra (*Cocos nucifera*, Coconut)
 - oil (*Elais guineensis*, Oil palm)
 - pith (*Metroxylon sagou*, Sago palm)
 - fruit (*Phoenix dactylifera*, date palm)
 - **Fibers**
 - rattan (*Calamus minutus*)
 - Horsehair (*Chamaerops humilis*, palmier nain)
 - fiber (*Raphia ruffia*)
 - vegetal ivory (Albumen of *Phytolophas spp.*)
 - **Medical**
 - alcaloids (*Areca catechu*, noix d' arec)
 - dewormer (*Areca oleracea*)




Simple leaves



- **opposites**
 - White latex
 - Yellow latex
 - No latex
 - With stipules
 - Without stipule
- **alternates**
 - White latex
 - With stipules
 - Without stipule
 - Red Latex
 - No latex
 - With stipules
 - Without stipule
 - Fiber net under bark, Odor
 - Without odor

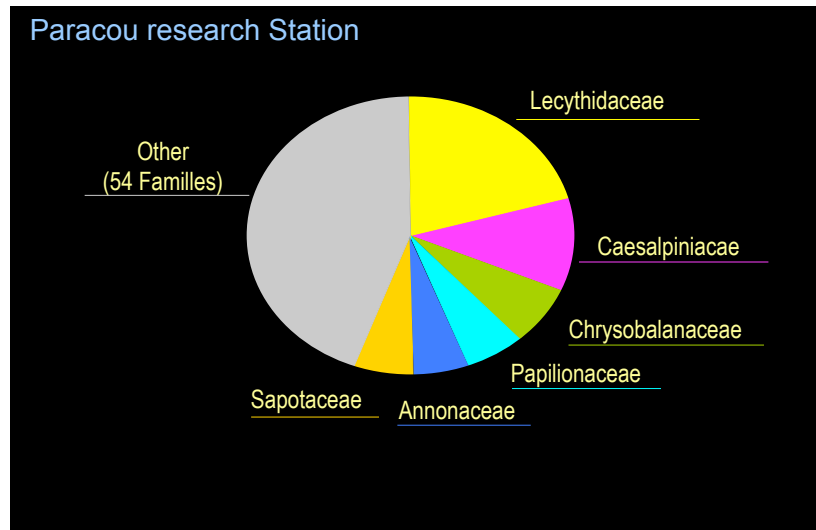
APOCYNACEAE	
CLUSIACEAE	
RUBIACEAE	
MELASTOMATACEAE	
MORACEAE, EUPHORBIACEAE	
SAPOTACEAE, APOCYNACEAE	
MYRISTICACEAE	
CHRYSOBALANACEAE	
ANNONACEAE	
LECYTHIDACEAE	

Feuilles composées



- composite and palmed
 - Opposite
 - Alternate
- composite and pinnate
 - Without stipule
 - Opposite
 - Alternate
 - With stipules
 - Pinnate
 - Bipinnate

BIGNONIACEAE	
EUPHORBIACEAE, MALVACEAE	
BIGNONIACEAE	
SAPINDALES	
CAESALPINIACEAE,	
MIMOSACEAE, PAPILIONACEAE	
CAESALPINIACEAE, MIMOSACEAE	



Simple leaves




- **opposites**
 - White latex
 - Yellow latex
 - No latex
 - With stipules
 - Without stipule
- **alternates**
 - White latex
 - With stipules
 - Without stipule
 - Red Latex
 - No latex
 - With stipules
 - Without stipule
 - Fiber net under bark, Odor
 - Without odor

APOCYNACEAE	
CLUSIACEAE	
RUBIACEAE	
MELASTOMATACEAE	
MORACEAE, EUPHORBIACEAE	
SAPOTACEAE, APOCYNACEAE	
MYRISTICACEAE	
CHRYSOBALANACEAE	
ANNONACEAE	
LECYTHIDACEAE	

SAPOTACEAE

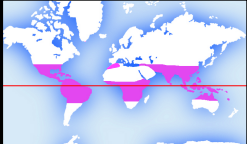
LES SAPOTACEAE – Vegetative characters

- Family of Sapodilla, Argan tree
- Trees and shrubs
- Simple leaves
- ! Rarely some stipules
- Φ alternate, rarely whorled
- With white latex (adhesive)



© F. Birnbaum et al.
Pouteria ambelaniifolia

80 genres, 800 sp.




Guianas
10 genres, 117 sp.


Pouteria (62 sp.)
Micropholis (19 sp.)
Chrysophyllum (19 sp.)
Manilkara (7 sp.)

LES SAPOTACEAE – Vegetative characters

Trees...




© P. Huetten
Pradosia cochlearia (Sapotaceae)




© C. Baraloto
Chrysophyllum pomiferum

LES SAPOTACEAE – Vegetative characters

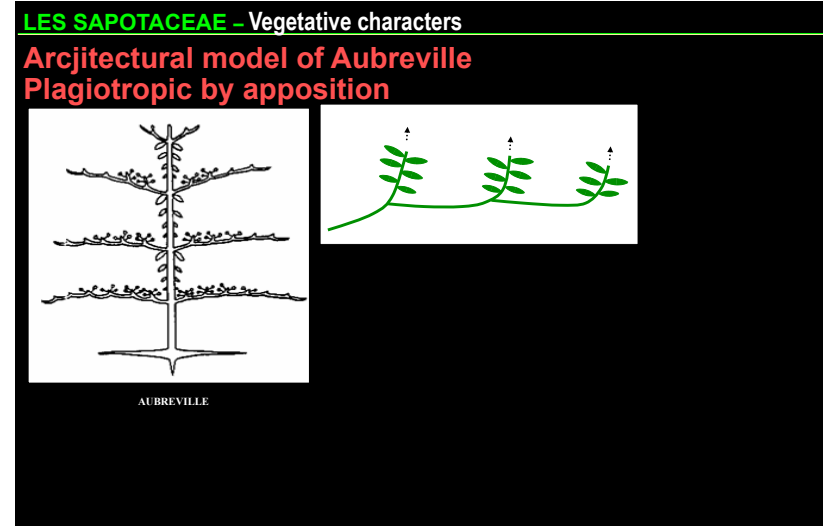
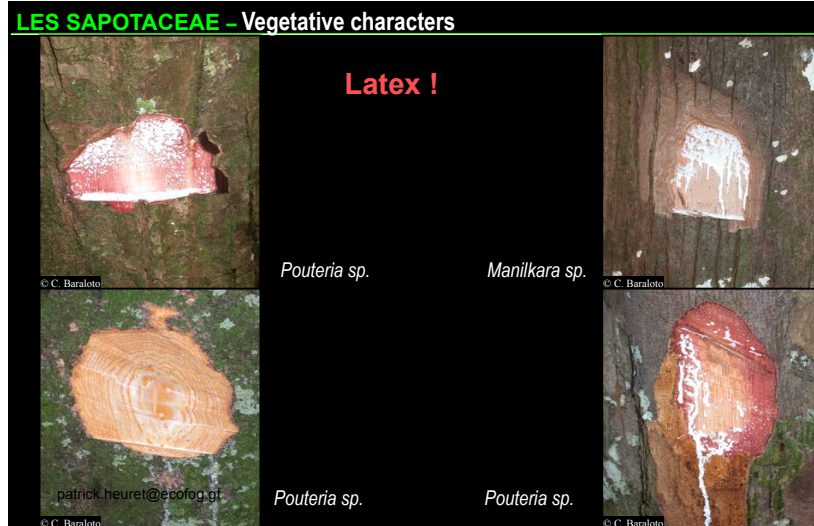
Simple leaves without stipule ; Φ alternate ; Cauliflorous



© P. Birnbaum et al.
Pouteria sp.



© P. Birnbaum et al.
Pouteria sp.



Simple leaves

- **opposites**
 - White latex
 - Yellow latex
 - No latex
 - With stipules
 - Without stipules
- **alternates**
 - White latex
 - With stipules
 - Without stipules
 - Red Latex
 - No latex
 - With stipules
 - Without stipules
 - Fiber net under bark, Odor
 - Without odor

APOCYNACEAE
CLUSIACEAE

RUBIACEAE
MELASTOMATACEAE

MORACEAE, EUPHORBIACEAE
SAPOTACEAE, APOCYNACEAE
MYRISTICACEAE

CHRYSOBALANACEAE

ANNONACEAE
LECYTHIDACEAE



CHRYSOBALANACEAE



LES CHRYSOBALANACEAE – Vegetative characters

- Trees
- Simple and stipulated leaves
- Φ alternate
- Glands on the petiole or at the base of the blades
- Lenticillate bark
- Reddish and rough internal bark
- Rarely, a red latex

17 genus, 525 species,
Mainly neotropical

Guianas
7 genus, 135 sp.



Licania (71 sp.)
Hirtella (33 sp.)
Couepia (20 sp.)
 Parinari (6 sp.)

Licania alba

LES CHRYSOBALANACEAE – Vegetative characters

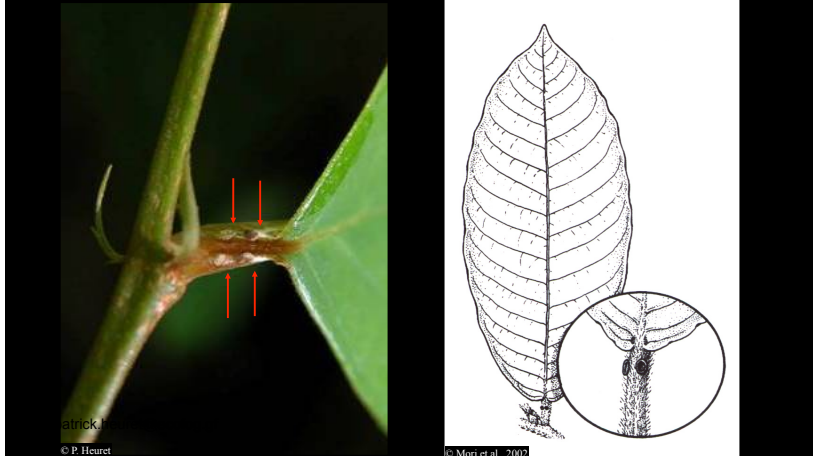
Stipules

© P. Birnbaum et al. *Parinari montana* © P. Birnbaum et al. *Licania alba*

LES CHRYSOBALANACEAE – Vegetative characters

Glands



LES CHRYSOBALANACEAE – flower and fruits



Licania cf. micrantha


LES CHRYSOBALANACEAE – flower and fruits



Parinari montana

LES CHRYSOBALANACEAE - Uses

Comestible fruits

-  *Chrysobalanus icaco* : Cocoplum, Paradise Plum, Icao
- Parinari montana* : Graine-roche (fruit and seeds are edible)

Wood are poorly exploited

Feuilles simples

- **opposées**
 - Latex blanc
 - Latex jaune
 - Pas de latex
 - Avec stipules
 - Sans stipules
- **alternes**
 - Latex blanc
 - Avec stipules
 - Sans stipules
 - Latex rouge
 - Pas de latex
 - Avec stipules
 - Sans stipules


• Fiber net under bark, Odor **ANNONACEAE**
 • Without Odor **LECYTHIDACEAE**

APOCYNACEAE
 CLUSIACEAE

RUBIACEAE
 MELASTOMATACEAE

MORACEAE, EUPHORBIACEAE
 SAPOTACEAE, APOCYNACEAE
 MYRISTICACEAE

CHRYSOBALANACEAE

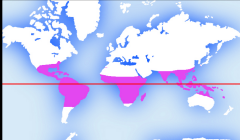


ANNONACEAE

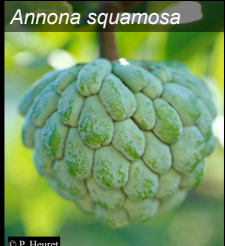
LES ANNONACEAE – Vegetative characters

- The family of sugar-Apple (Corossol) !
- A family exclusively tropical !
Excepted genus *Asimina* in North America !
- Trees, Shrubs, Lianas
- Simple leaves without stipules
- Φ Alternate distichous
- Aromatic odor


130 genus, 2300 species



Annona squamosa




© P. Heuret




Guianas
16 genres, 120 sp.

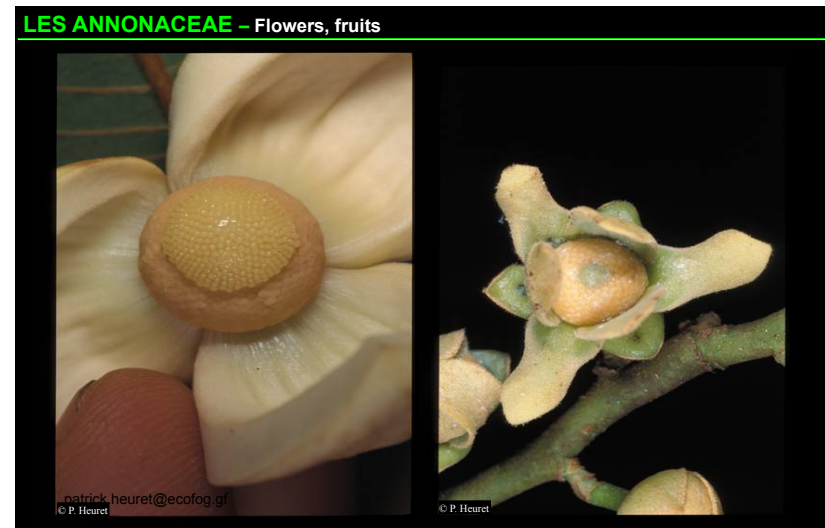
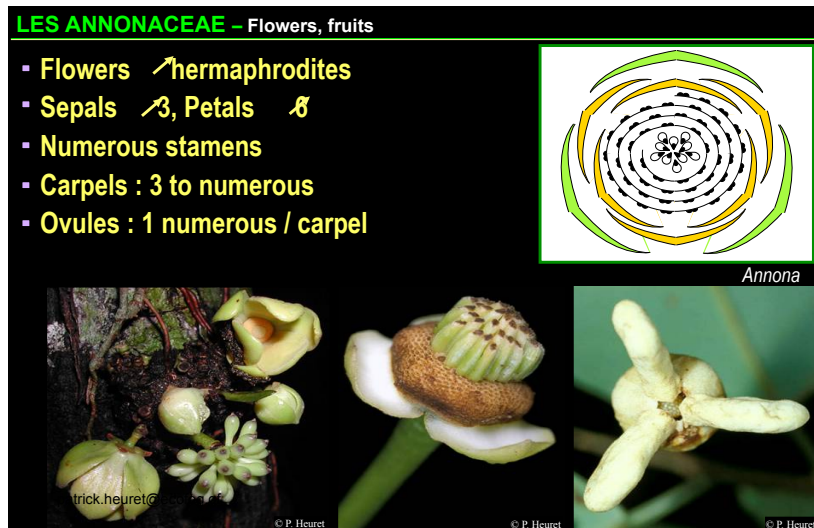
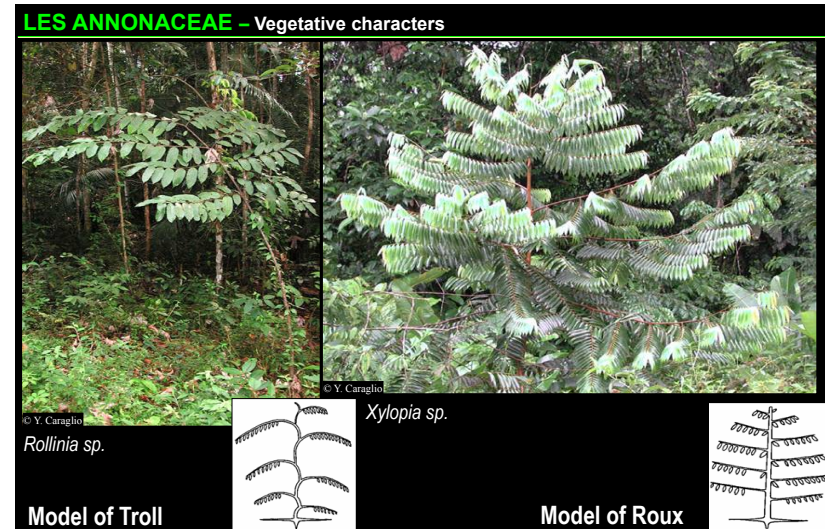
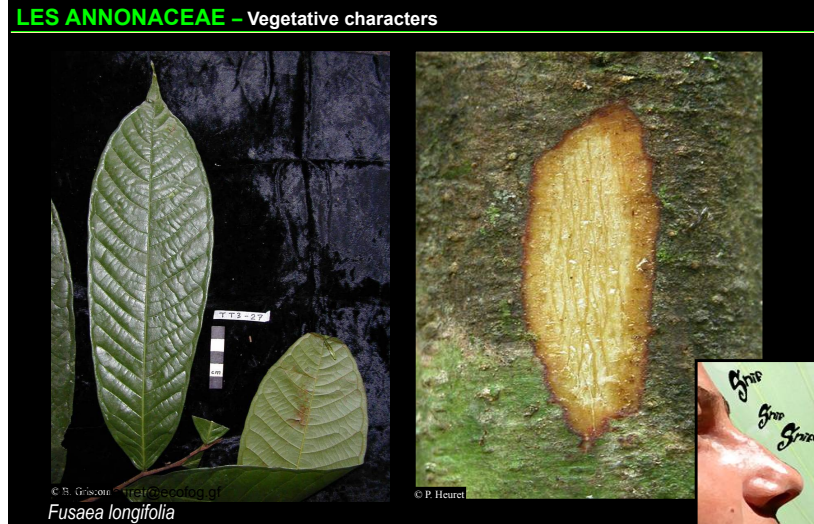
LES ANNONACEAE – Vegetative characters



Xylopia cf. cuspidata



Klarobelia sp.



LES ANNONACEAE – Flowers, fruits

Fused berries / syncarp fruits

© P. Heuret
 © P. Heuret
 © P. Heuret

Annona reticulata *Annona sericea* *Annona squamosa*

LES ANNONACEAE – Flowers, fruits

**Independent berries.....
apocarpic fruits**

© P. Heuret © P. Heuret & J. Munzinger © P. Heuret

Anaxagorea dolichocarpa *Cymbopetalum brasiliense* *Guatteria sp.*

LES ANNONACEAE - Uses

comestible fruits

- Annona reticulata* : custard-apple
- Annona squamosa* : Sugar-apple
- ...

Cananga odorata :
L' Ilang- Ilang
Used in perfumery

© E. Nicolini

Feuilles simples

- **opposées**
 - Latex blanc
 - Latex jaune
 - Pas de latex
 - Avec stipules
 - Sans stipules
- **alternes**
 - Latex blanc
 - Avec stipules
 - Sans stipules
 - Latex rouge
 - Pas de latex
 - Avec stipules
 - Sans stipules
 - Fiber net under bark, Odor

• Without Odor

APOCYNACEAE
CLUSIACEAE

RUBIACEAE
MELASTOMACEAE

MORACEAE, EUPHORBIACEAE
SAPOTACEAE, APOCYNACEAE
MYRISTICACEAE

CHRYSOBALANACEAE

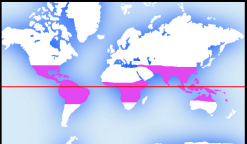
ANNONACEAE
LECYTHIDACEAE

LECYTHIDACEAE


LES LECYTHIDACEAE – Vegetative characters

- The family of the brazilian nut
- Trees, Shrubs
- Simple leaves without stipules
- Φ Alternate
- Fibrous bark

25 genres, 240 espèces



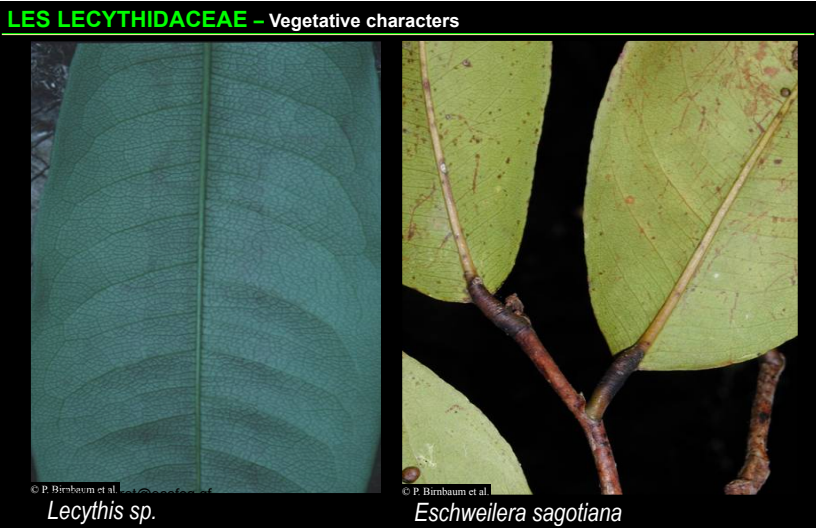
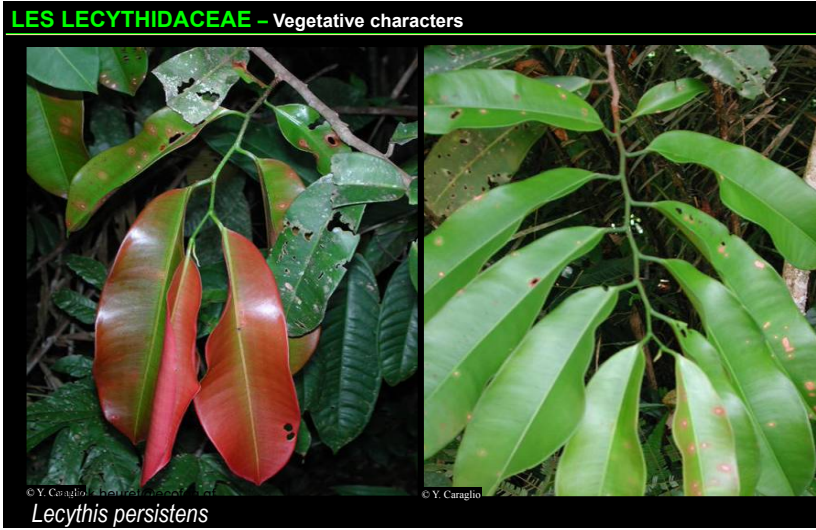
Guianas
6 genres, 41 sp.



Bertholletia excelsa



- Simple leaves without stipules
- Φ Alternate distichous

Eschweilera
Gustavia
Lecythis
Couratari
Corythophora
Couroupita



LES LECYTHIDACEAE – Flowers and fruits





- Zygomorphic flower
- Fruit = Capsule

Couroupita guianensis
Lecythidaceae
© G. D. Carr

Couroupita guianensis
Lecythidaceae
© Gerald D. Carr

LES LECYTHIDACEAE – Flowers and fruits

Lecythis poiteaui

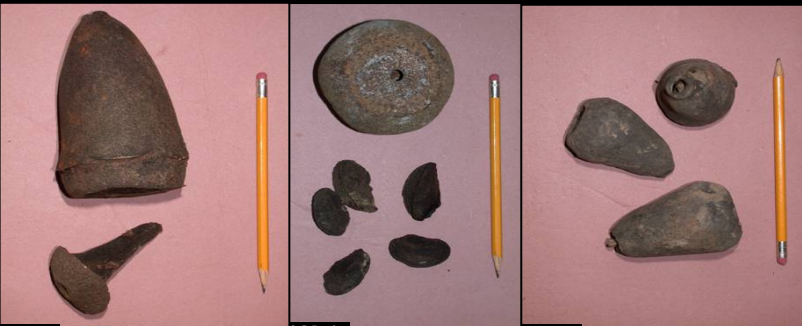
Gustavia hexapetala

© P. Birnbaum et al.

© P. Birnbaum et al.

© P. Birnbaum et al. 1997. @ecoidea
Lecythis sp.

LES LECYTHIDACEAE – Flowers and fruits



© C. Baraloto
Couratari sp.

© C. Baraloto
Bertholletia excelsa

© C. Baraloto
Cariniana sp.

Eschweilera – Lateral arillus
Lecythis – apical arillus

LES LECYTHIDACEAE - Uses

Comestible fruits
Bertholletia excelsa : The Brazil nut tree
Lecythis zabucajo : The paradise nut tree ; an excellent seed

A fibrous bark
 Used to produce hammock or strip to climb trees; Cigarette paper ; ropes

A logged wood
 A solid wood for beams, poles (*Eschweilera congestiflora*)

Feuilles composées

- composite and palmed
 - Opposite
 - Alternate
- composite and pinnate
 - Without stipule
 - Opposite
 - Alternate
 - With stipules
 - Pinnate
- Bipinnate


BIGNONIACEAE
EUPHORBIACEAE, MALVACEAE

BIGNONIACEAE
SAPINDALES

CAESALPINIACEAE,
MIMOSACEAE, PAPILIONACEAE

CAESALPINIACEAE, MIMOSACEAE

Cronquist, 1981




FABACEAE

LES FABACEAE – Vegetative characters

- Trees, Shrubs, Liana, Herbs
- Compound and pinnate leaves
- Stipules and sometime stipels
- Φ alternate
- Pulvinus at the base of the petiole
- Fruits = pods


3 sub-families

Caesalpinoideae




patrick.heuret@ecofog.gf
© P. Birnbaum et al.

Mimosideae



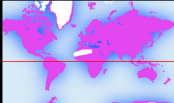
© P. Birnbaum et al.

Faboideae ou Papilionoideae



© C. Baraloto.

650-700 genus,
18000 species
Acacia = 1200 sp.
Mimosa = 500 sp.



LES LEGUMINEUSES – Vegetative characters

Three (sub) families

Trait	Caesalp.	Mimos.	Papilion.
Leaves	Mostly once-pinnate; Often alternate leaflets	Mostly bipinnate	Mostly imparipinnate; mostly opposite leaflets
Glands	Mostly lacking	Often rachis glandes	Mostly lacking
Odor	Not much	Green-bean	Legume/cucumber
Flower	Bilateral but equal	Actinomorphic	Pea-like

patrick.heuret@ecofog.gf


Sometimes red

CAESALPINOIDEAE


LES CAESALPINOIDEAE – Vegetative characters

- Tree, Shrubs, Lianas, (herbs -)
- Compound leaves with stipules
- Generally imparipinnate
- Some taxons with bifoliate leaves
- Alternate leaflet
- Φ Alternate
- Architectural model of Troll

150 genus, 2700 species
Bauhinia, Cassia, Copaifera, Hymenaea, Peltoogyne



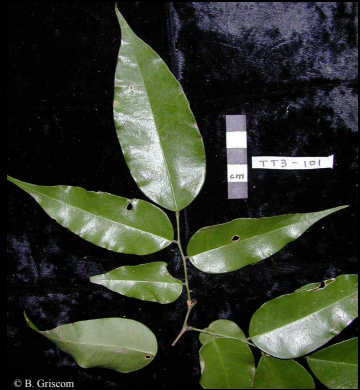
© Y. Caraglio, Heuret @ cofog.gf
Eperua falcata




© Y. Caraglio
Recordoxylon speciosum

LES CAESALPINOIDEAE – Vegetative characters

Compound leaves (often alternate leaflets)




© B. Griseom
Dialium guianense




© B. Griseom
Tachigali sp.

LES CAESALPINOIDEAE – Vegetative characters

Some bifoliate leaves



© B. Griseom
Hymenaea oblongifolia



© P. Heuret
Hymenaea courbaril

LES CAESALPINIOIDAE – Vegetative characters

A wood with a density of 1.1




© P. Birnbaum et al.
Bocoa prouacensis

© C. Baraloto

LES CAESALPINIOIDAE – Vegetative characters

stipules are compound or foliated



© P. Heuret
Tachigali melinonii


© P. Birnbaum et al.
Eperua grandiflora.

MIMOSIDAE

LES MIMOSIDAE – Vegetative characters

- Trees, shrubs, liana, (herbs -)
- Leaves mostly bipinnate
- Phyllodes
- Φ alternate
- Glands on the leaves
- Winged rachis on some Inga

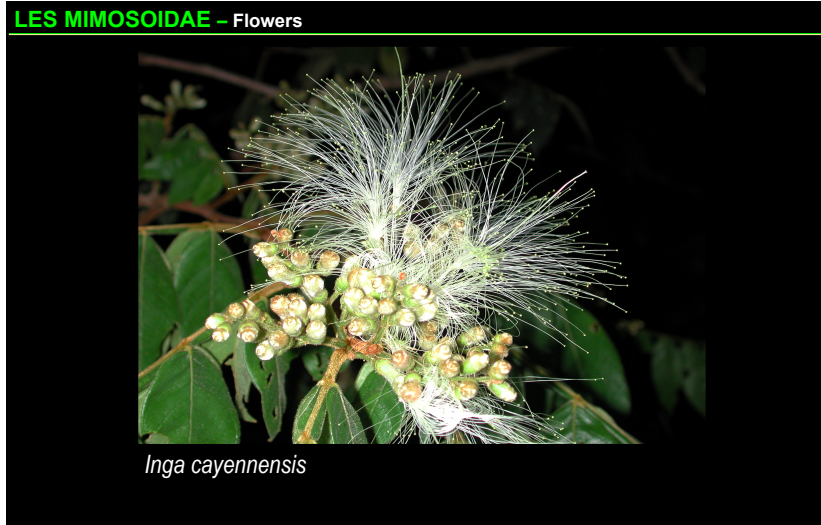
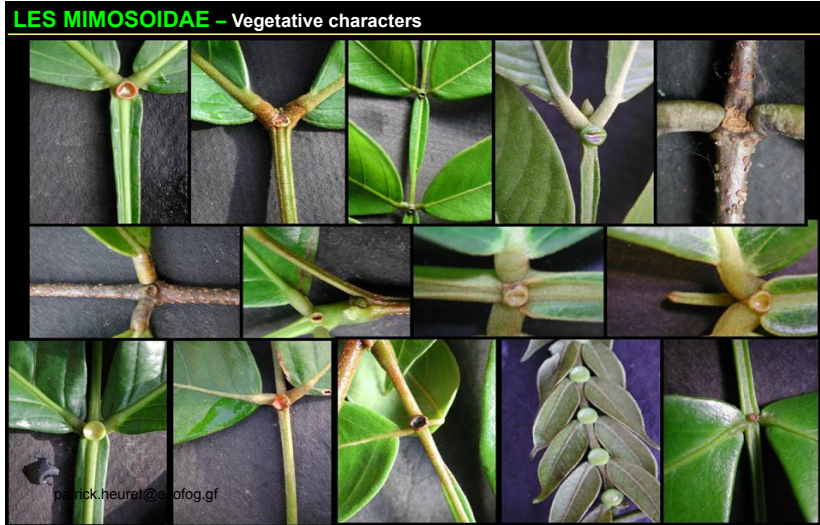
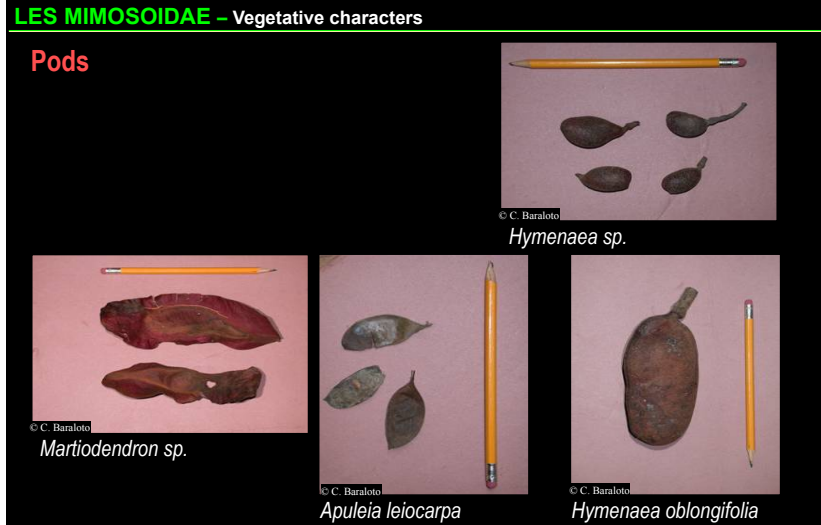
40 genus, 2500 species
Acacia, Enterolobium, Inga, Parkia



© C. Baraloto
Inga cayennensis

© P. Birnbaum et al.
Inga sp.

© P. Birnbaum et al.
Enterolobium sp.



LES MIMOSOIDAE – Fruits

*Parkia pendula*

© C. Baraloto

*Enterolobium sp. 1*

© C. Baraloto

*Parkia sp.*

© C. Baraloto

patricia.cheuret@ecofog.gf

*Enterolobium sp. 2*

© C. Baraloto

PAPILIONOIDEAE

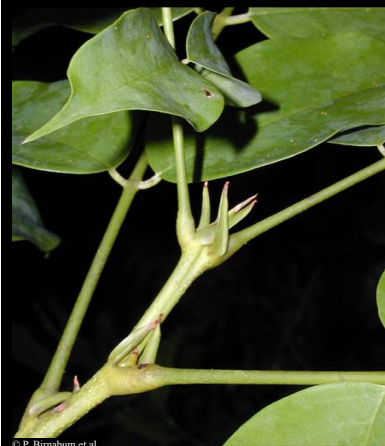
PAPILIONOIDAE – Vegetative characters

- (+) Herbs, lianas, some trees
- Compound and bipinnate leaves, trifoliate leaves
- Φ alternate
- Generally imparipinnate
- Sometime stipels
- Winged rachis in some Swartzia
- red latex rouge in some Swartzia

429 genus, 12620 species

*Andira, Dipteryx,
Hymenolobium, Swartzia*

LES PAPILIONOIDAE – Vegetative characters



© P. Birnbaum et al.



© Y. Caraglio

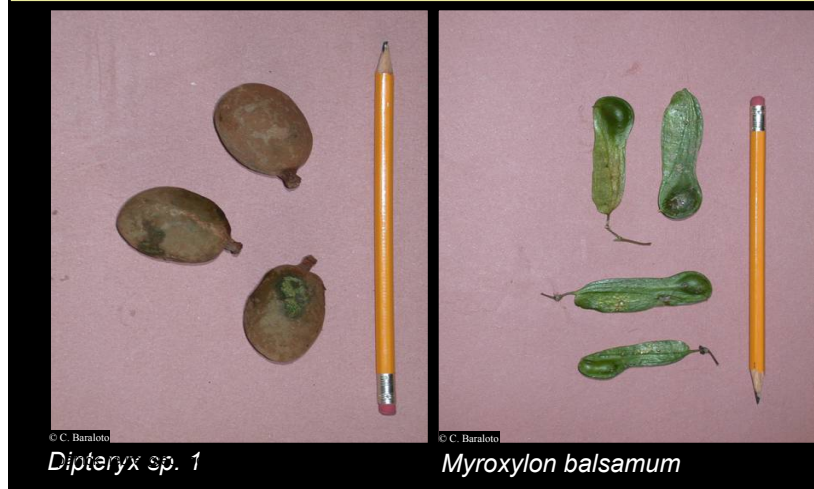
LES PAPILIONOIDAE – Vegetative characters



LES PAPILIONOIDAE – Vegetative characters



LES PAPILIONACEAE – Fruits



FABACEAE - Uses

Food

Soja, peanut, pea, bean, tamarind, Carob, ...

Pods, Seeds, Arillas, Oils...

Agroforestry, Eco-ingenierie

Dinitrogen fixation

Traditional uses

« Nivrée » fishing (Rotenone), hallucinogenic (Yopo)

Intérêts pharmaceutiques

Gommes (ex: arabic gum of Acacias)

Wood logging

L' **Angélique** (*Dicorynia guianensis*), Le **Wacapou** (*Vouacapoua americana*),
L' **Amarante** (*Peltogyne venosa*), Le **Courbaril** (*Hymenaea courbaril*), Le **Wapa**
(*Eperua falcata*), Le **Saint-martin Jaune/Rouge** (*Hymenobium flavum/Andira*
coriacea), Le **Bois-serpent** (*Zygia racemosa*) etc.



WARNING

*This course material is designed to be accompanied
by verbal explanations.*

*If you did not attend the presentation, the reading of
the slides may lead you to misinterpretations*