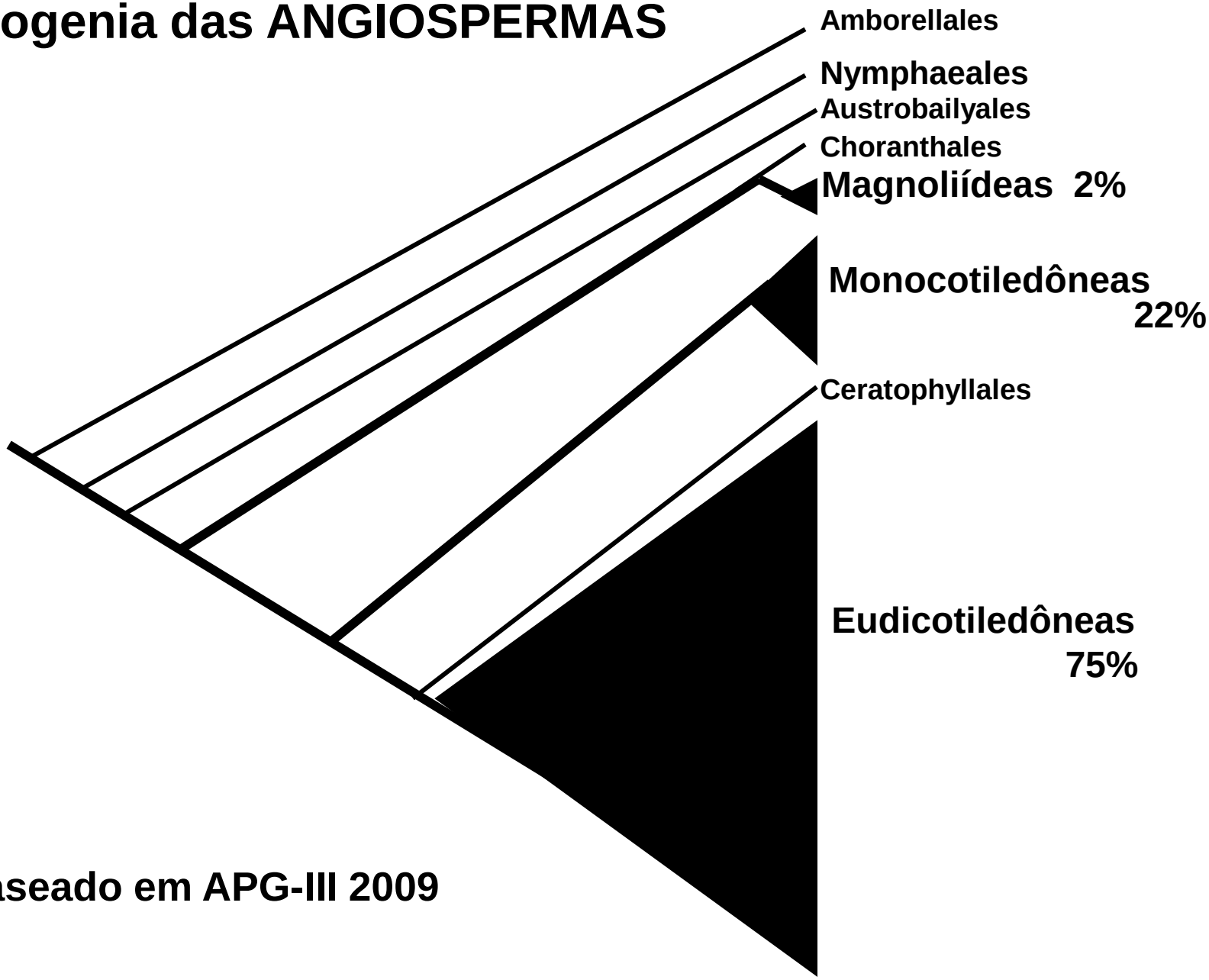
ANGIOSPERMAS EUDICOTILEDÔNEAS

Filogenia das ANGIOSPERMAS

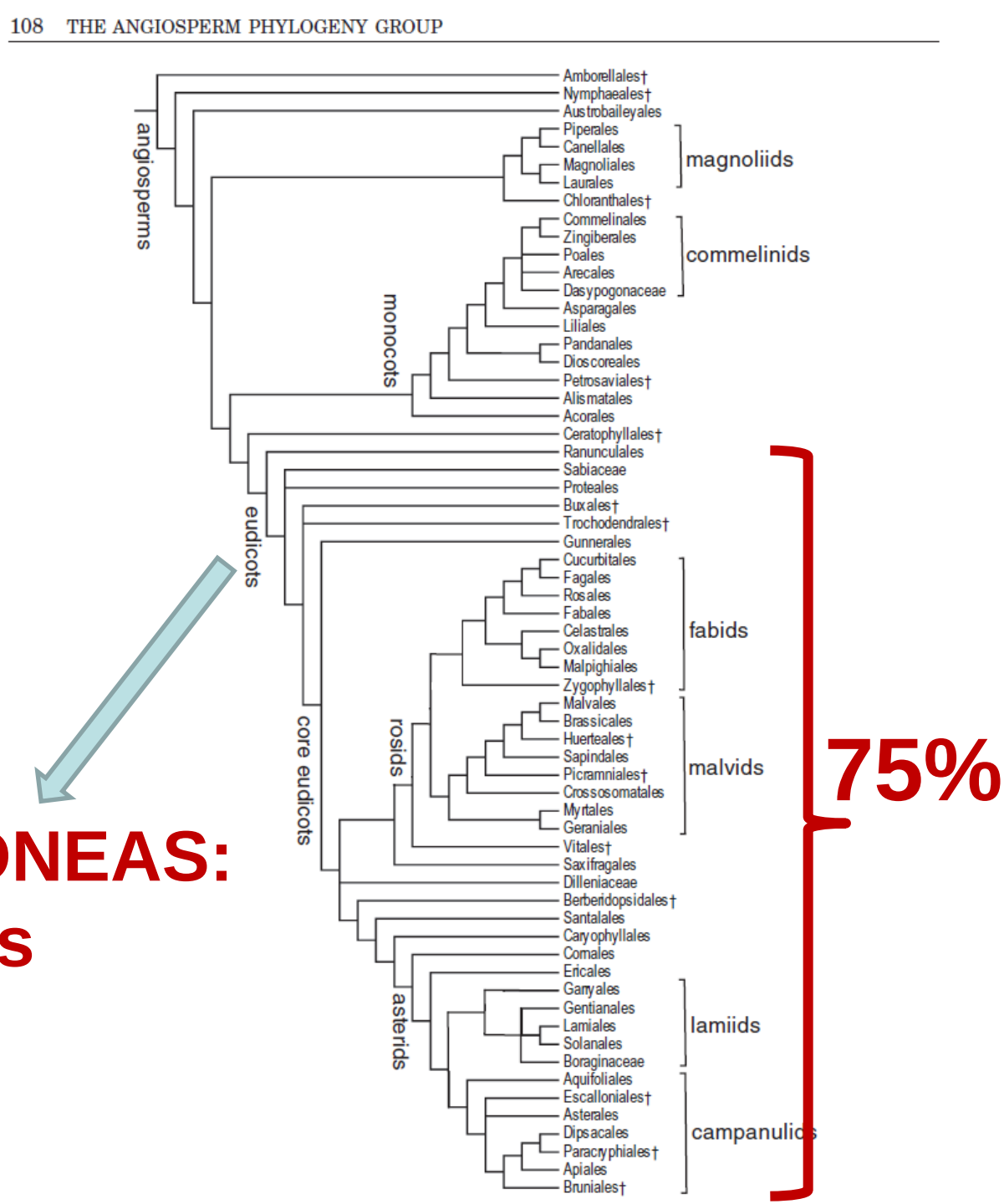


Baseado em APG-III 2009

APG-III 2009

18S rDNA
***rbc*L**
atp*B*
***atp*1**
***mat*R**

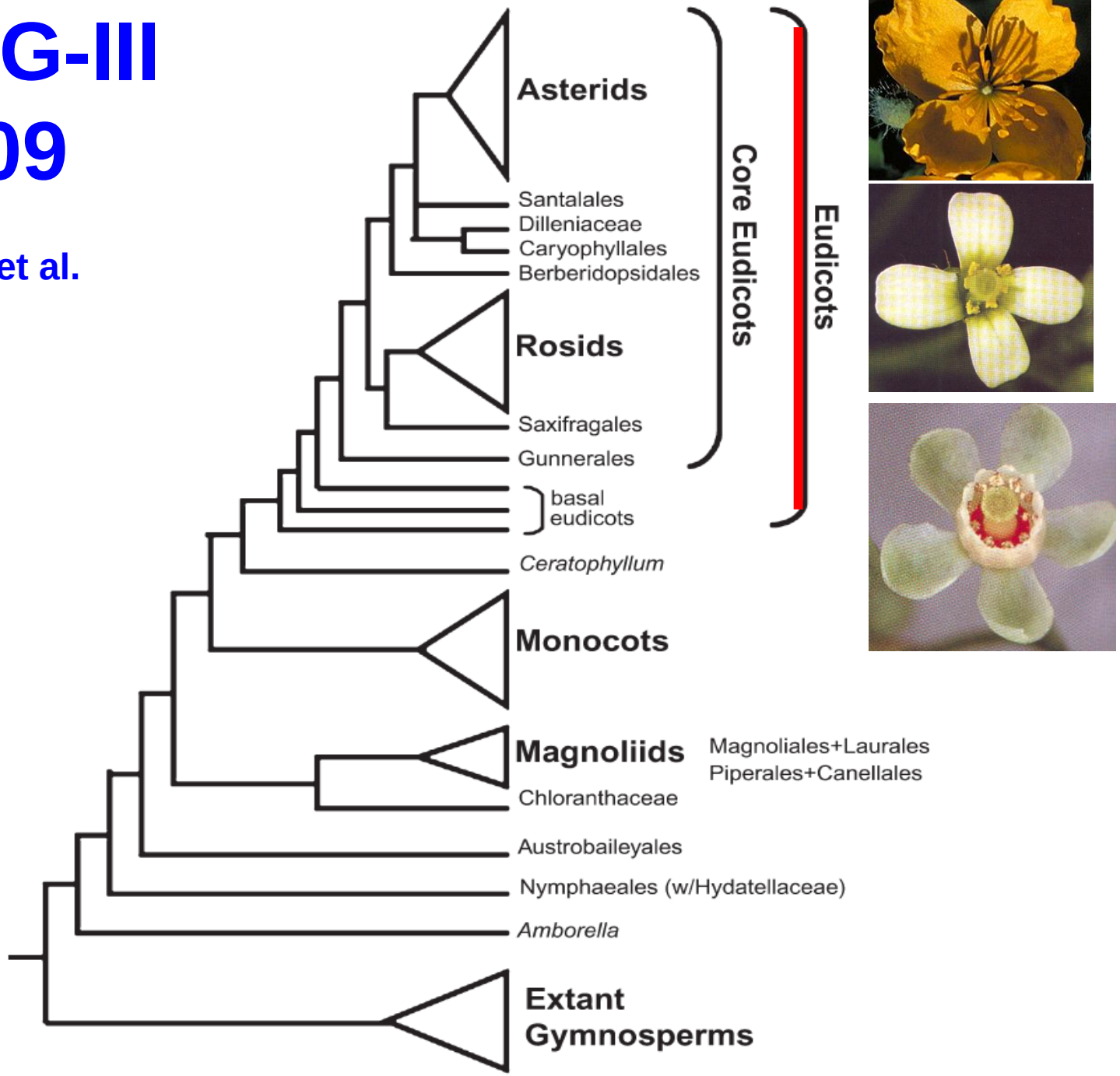
+ 61 genes de 45 táxons

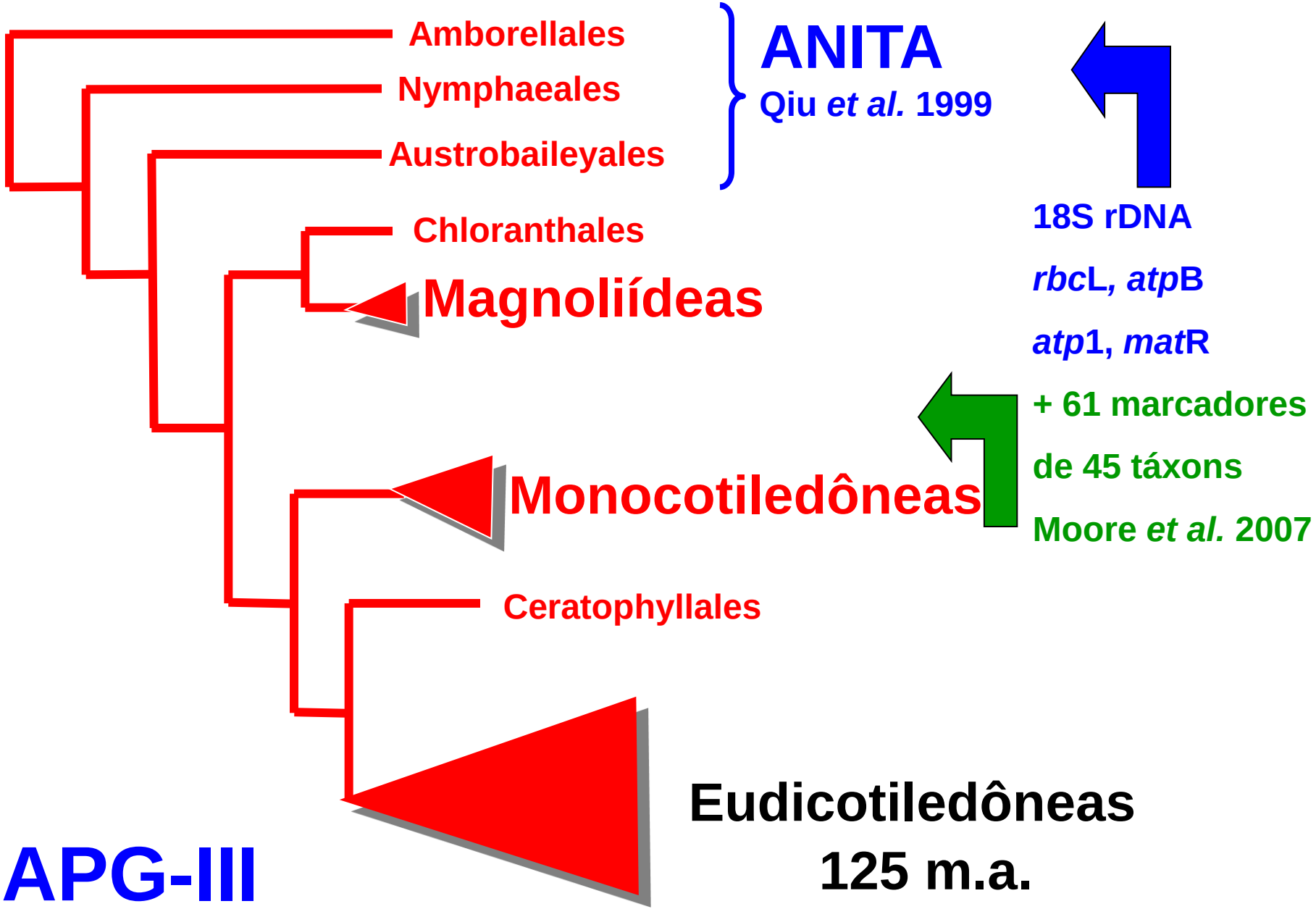


EUDICOTILEDÔNEAS:
41 ordens

APG-III 2009

Soltis et al. 2009

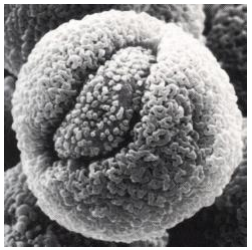



Amborellales
Nymphaeales
Austrobaileyales
ANITA
Qiu et al. 1999
18S rDNA
rbcL, atpB
atp1, matR
Chloranthales
Magnoliídeas
+ 61 marcadores
de 45 táxons
Moore et al. 2007
Monocotiledôneas
Ceratophyllales
Eudicotiledôneas
125 m.a.
APG-III
2009

Amborellales

Nymphaeales

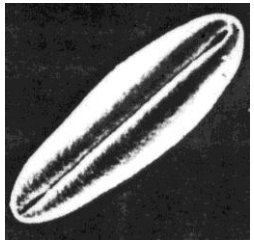
Austrobaileyales

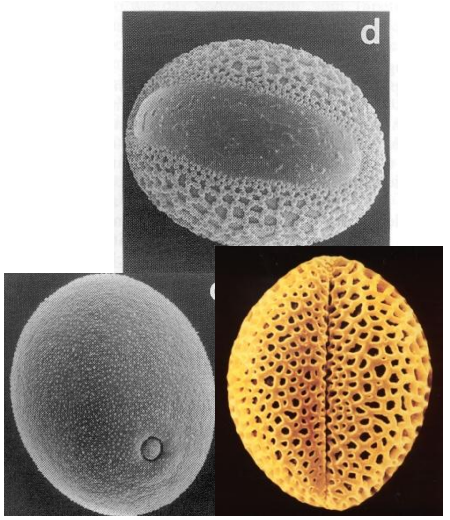


APG III 2009

Chloranthales

Magnoliídeas

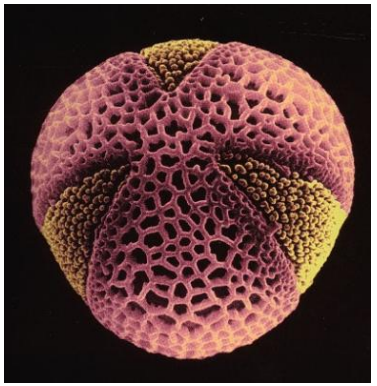


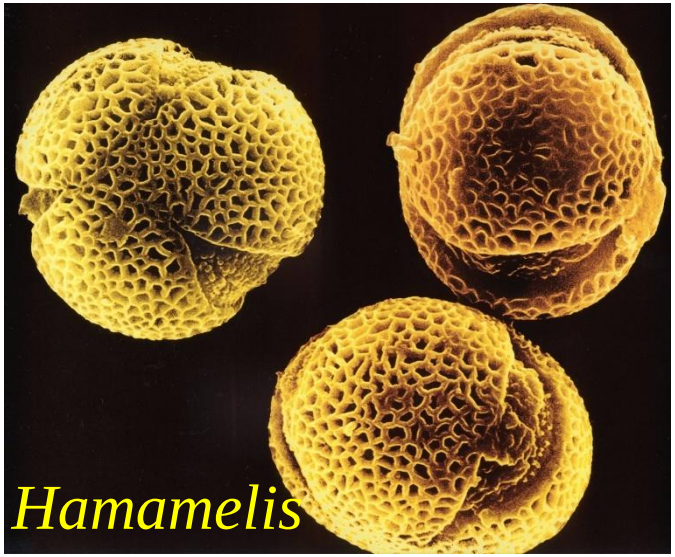


Monocotiledôneas

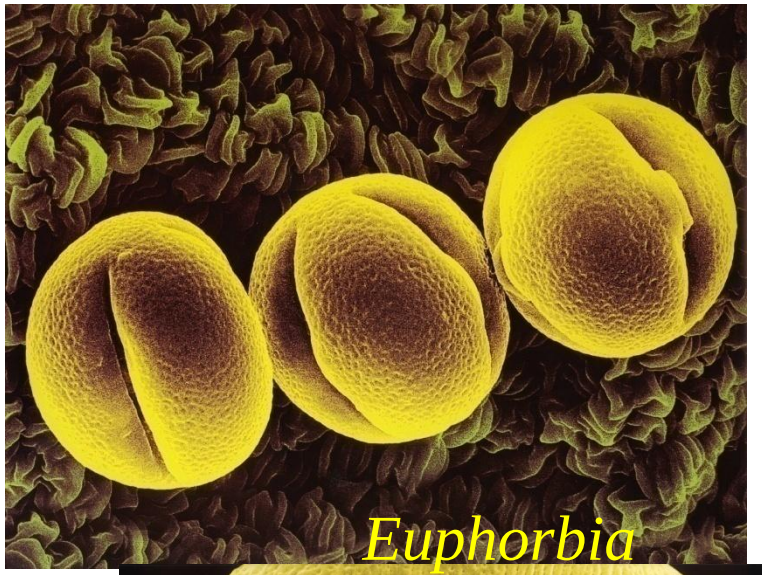
Ceratophyllales

Eudicotiledôneas (ou Tricolpadas)



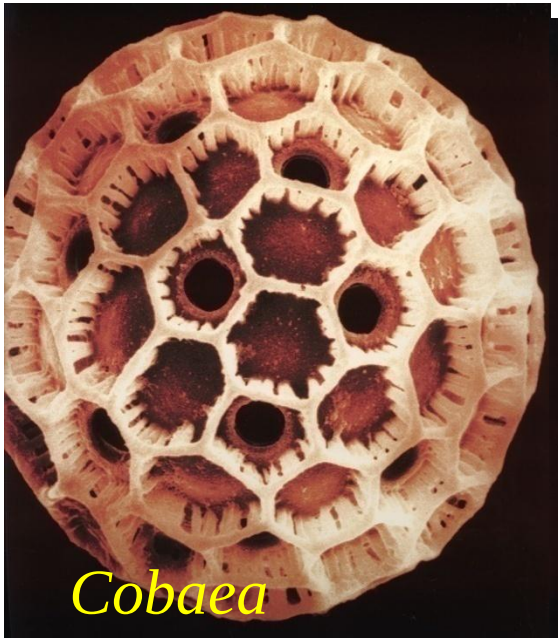


pólen tricolpado

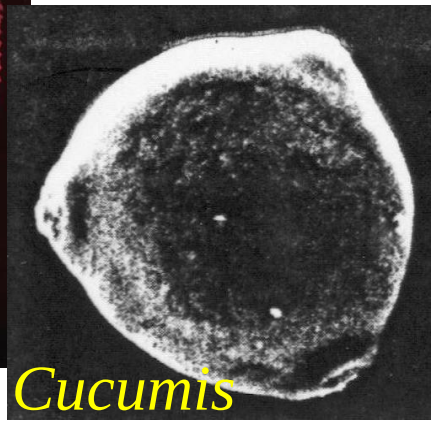


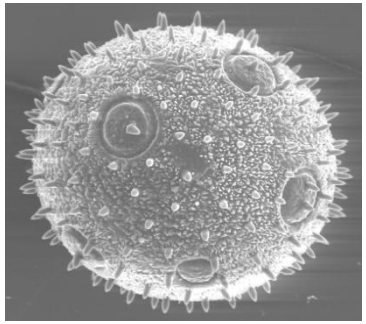
pólen tricolporado

EUDICOTILEDÔNEAS

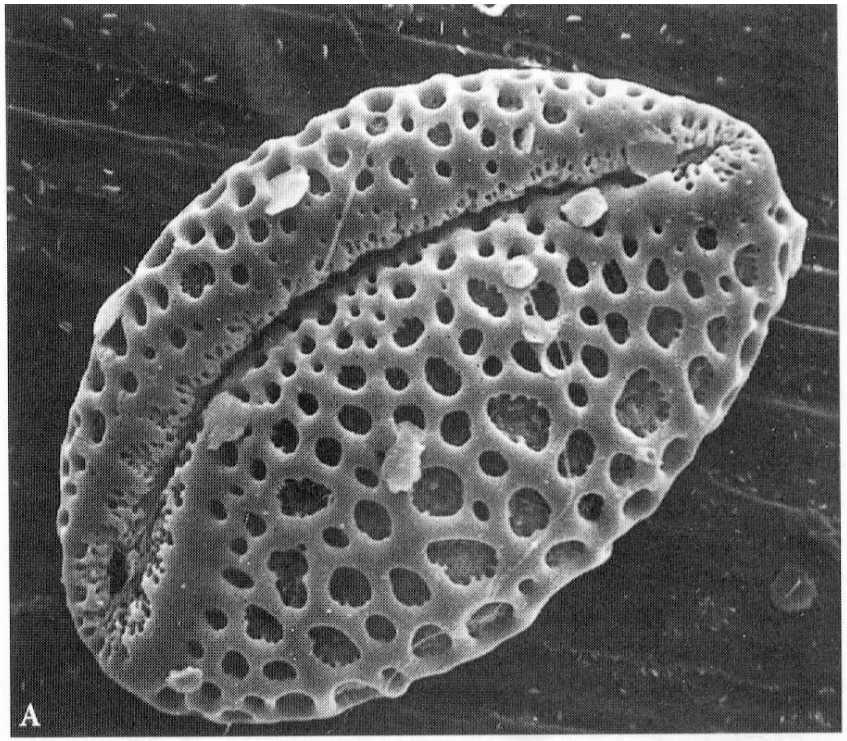


pólen porado

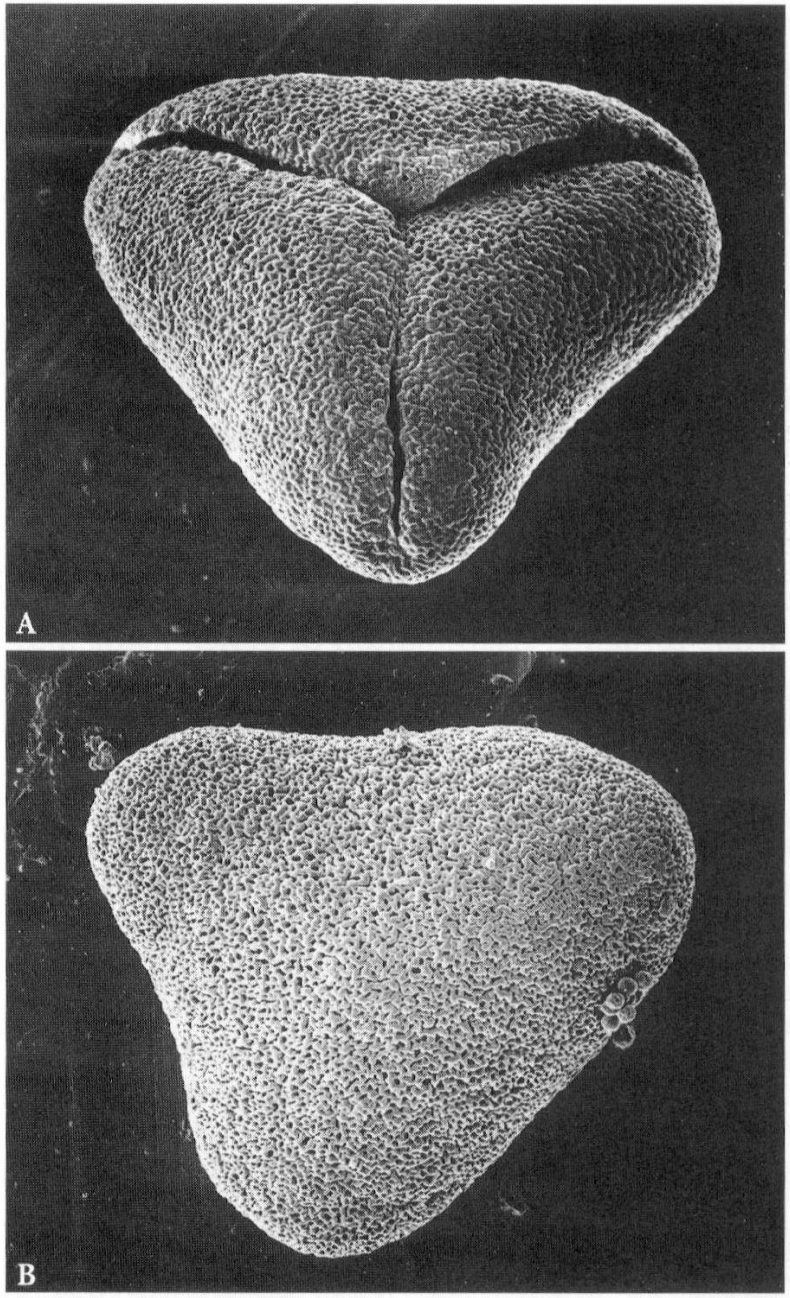




Cucurbita

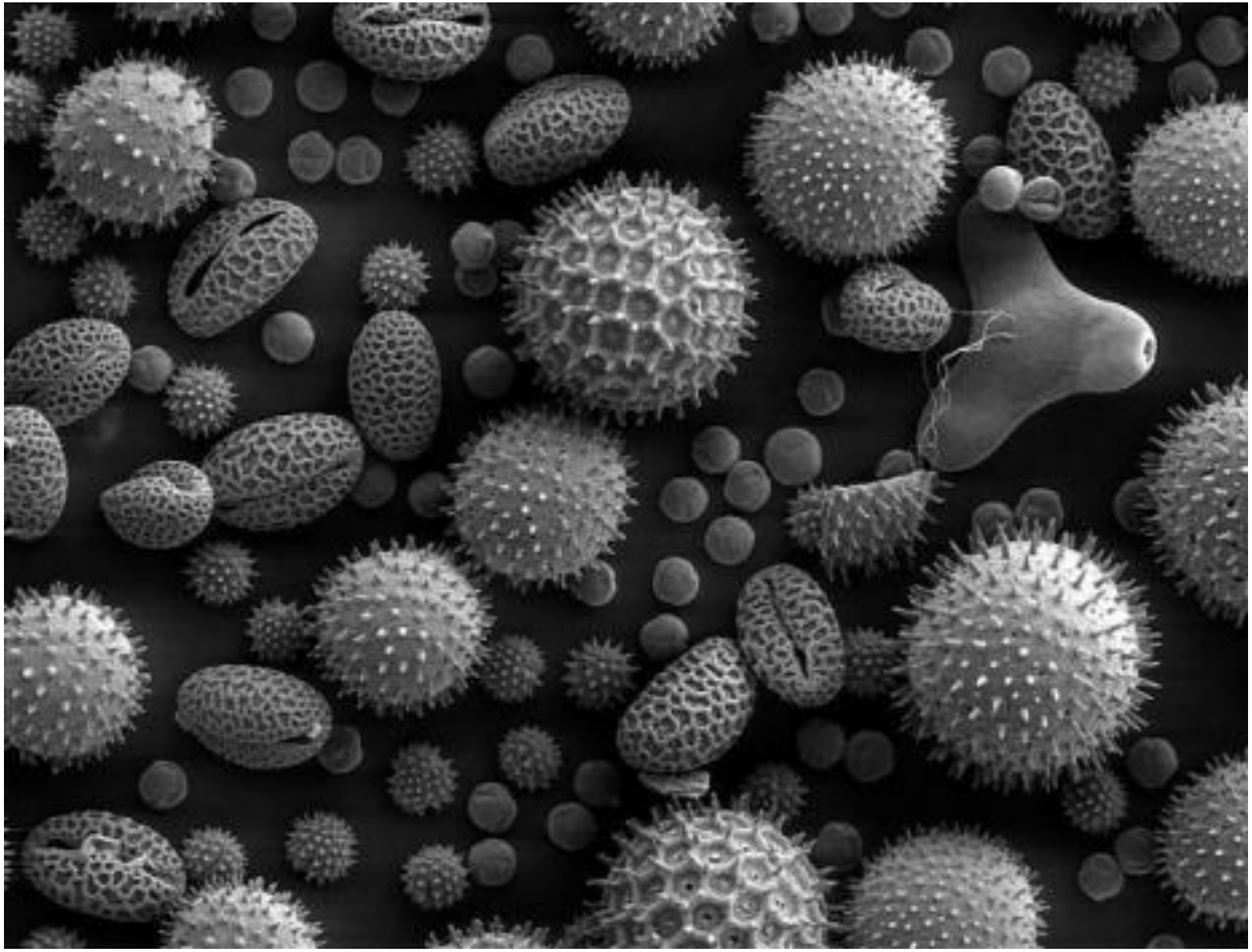


***Manfreda*, Agavaceae**



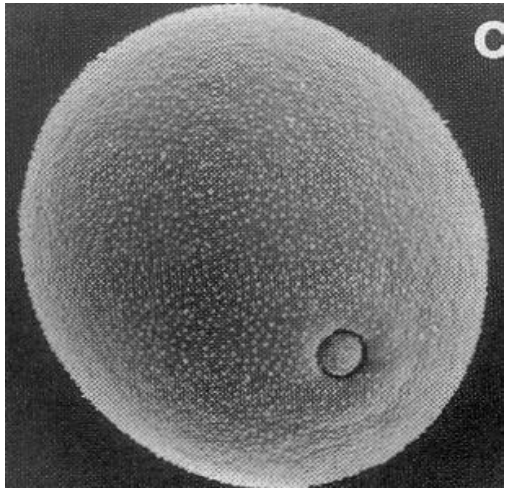
***Stypandra*, Alliaceae**

MONOCOTILEDÔNEAS



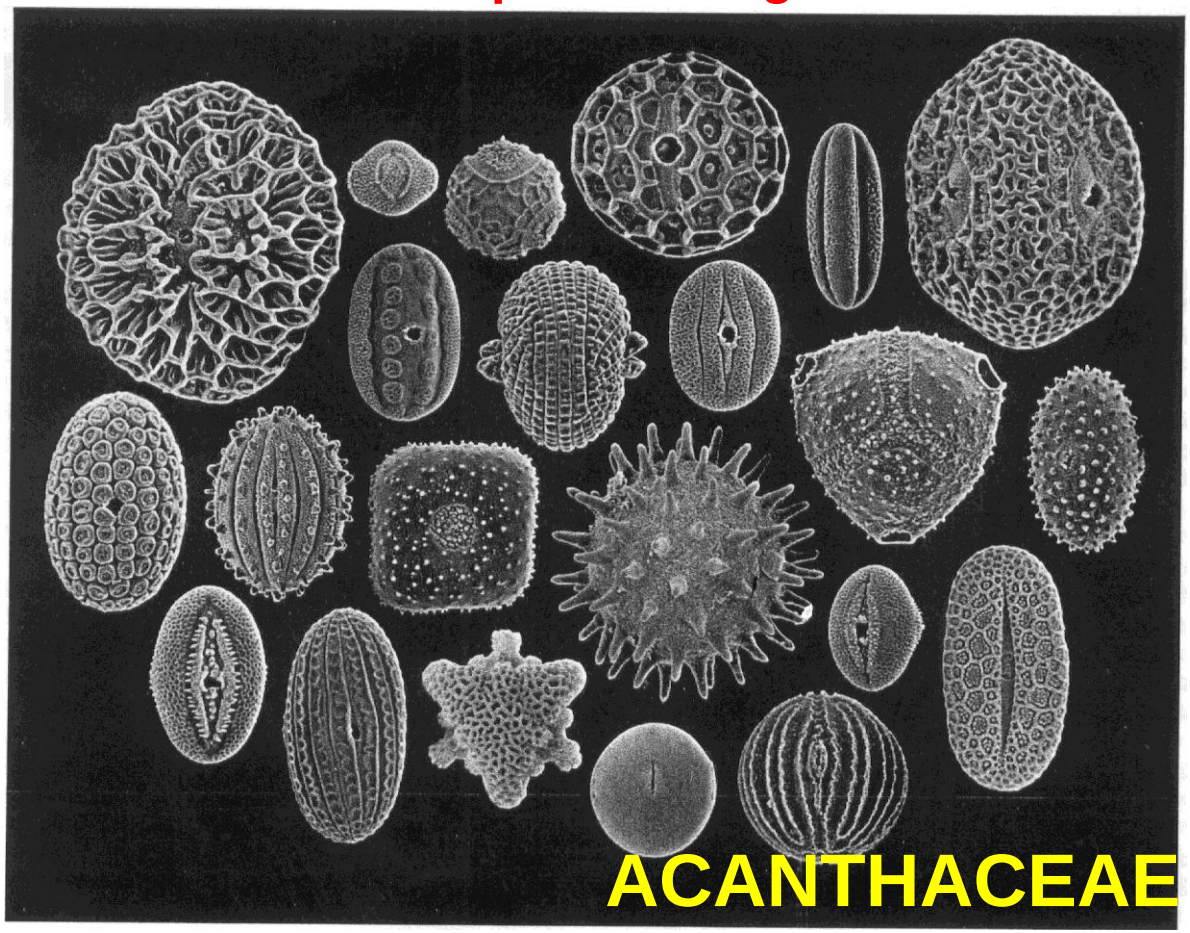
Diversidade polínica - evidências para sistemática e paleontologia

Evidências polínicas em sistemática e paleontologia



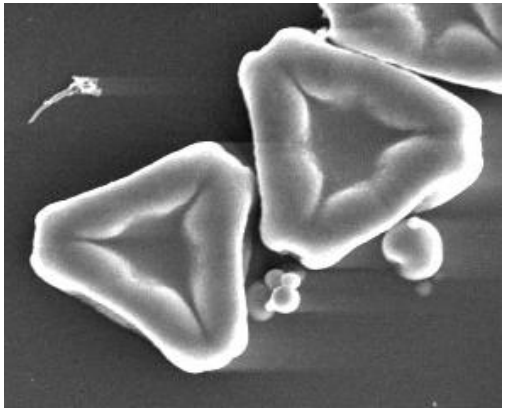
GRAMINEAE

Família estenopolínica



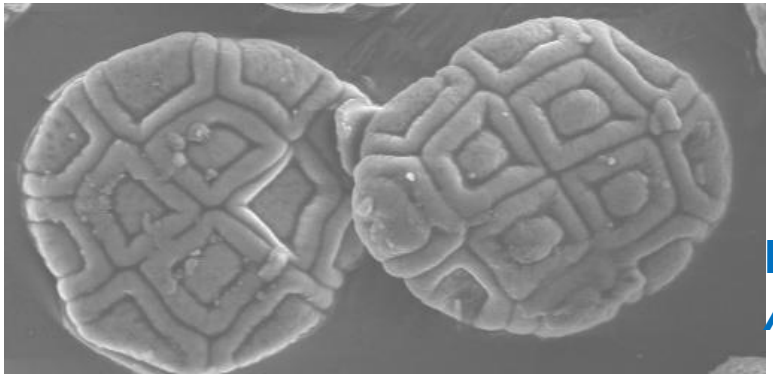
ACANTHACEAE

Família euripolínica



Myrtaceae

Eucalyptus



Leguminosae

Acacia

Amborellales

Nymphaeales

Austrobaileyales

Chloranthales

Magnoliídeas

Monocotiledôneas

Ceratophyllales

Eudicotiledôneas

APG III 2009

miricetina

APG III 2009

Amborellales

Nymphaeales

Austrobaileyales

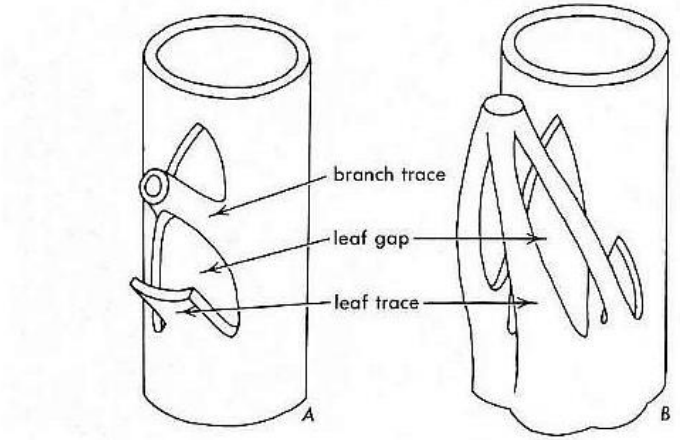
Chloranthales

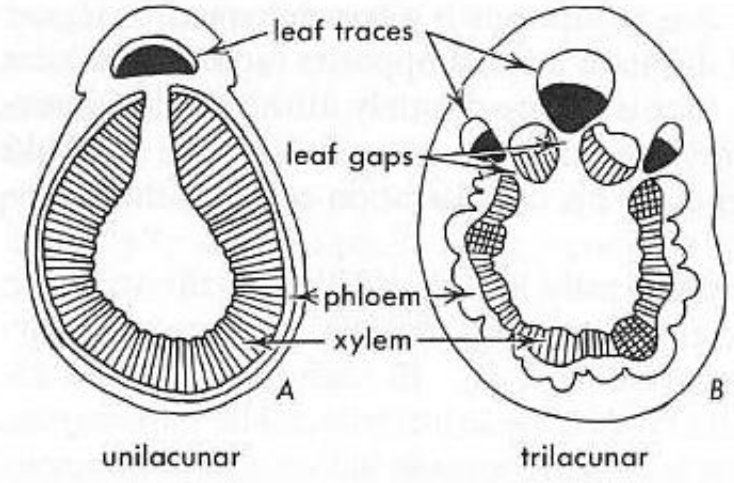
Magnoliídeas

Monocotile-dôneas

Ceratophyllales

Eudicotiledôneas





nós trilacunares

APG III 2009

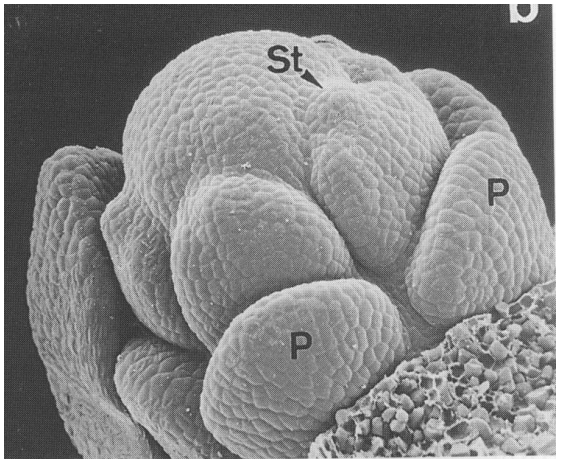
Amborellales

Nymphaeales

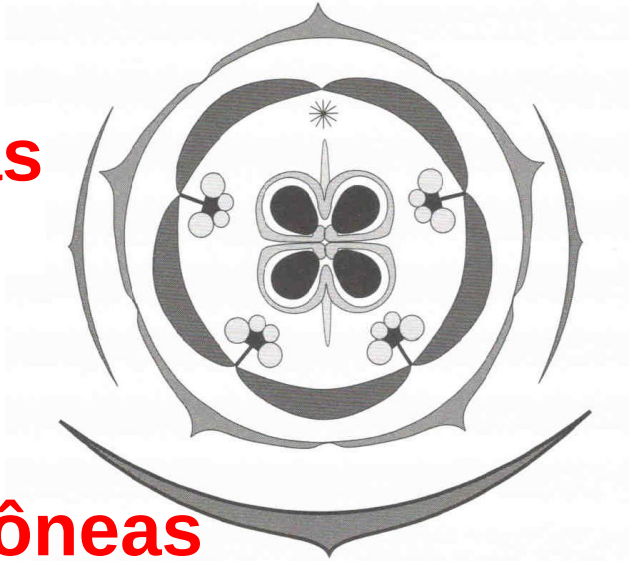
Austrobaileyales

Chloranthales

Magnoliídeas



Monocotiledôneas

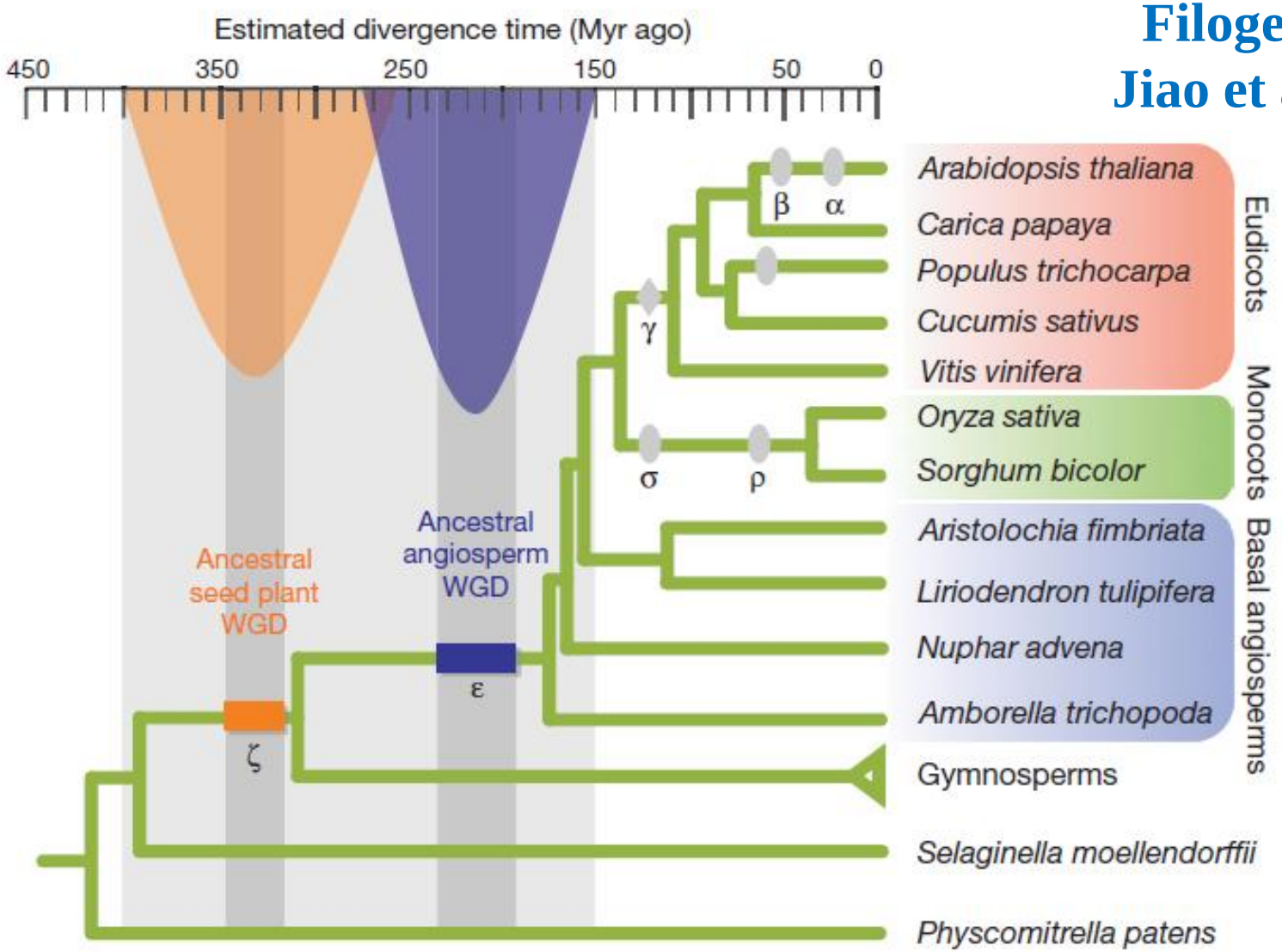


flores cíclicas

Ceratophyllales

Eudicotiledôneas

Filogenômica
Jiao et al. 2011



12.6 milhões de sequências de linhagens-pivôs: 2 grupos de WGDs (whole-genome duplication) antigos: 319 m.a. e 192 m.a. (poliploidização seguida de perda de genes e diploidização)

Figure 3 | Ancestral polyploidy events in seed plants and angiosperms. Two ancestral duplications identified by integration of phylogenomic evidence and molecular time clock for land plant evolution. Ovals indicate the generally accepted genome duplications identified in sequenced genomes (see text). The diamond refers to the triplication event probably shared by all core eudicots. Horizontal bars denote confidence regions for ancestral seed plant WGD and ancestral angiosperm WGD, and are drawn to reflect upper and lower bounds of mean estimates from Fig. 2 (more orthogroups) and Supplementary Fig. 5 (more taxa). The photographs provide examples of the reproductive diversity of

Plants with double genomes might have had a better chance to survive the Cretaceous–Tertiary extinction event

Filogenômica
Fawcett et al. 2009

evento hexaplóide no genoma ancestral das eudicotiledôneas

suggest that polyploid species can have a higher adaptability and increased tolerance to different environmental conditions. We propose that polyploidization may have contributed to the survival and propagation of several plant lineages during or following the KT extinction event. Due to advantages such as altered gene expression leading to hybrid vigor and an increased set of genes and alleles available for selection, polyploid plants might have been better able to adapt to the drastically changed environment 65 million years ago.

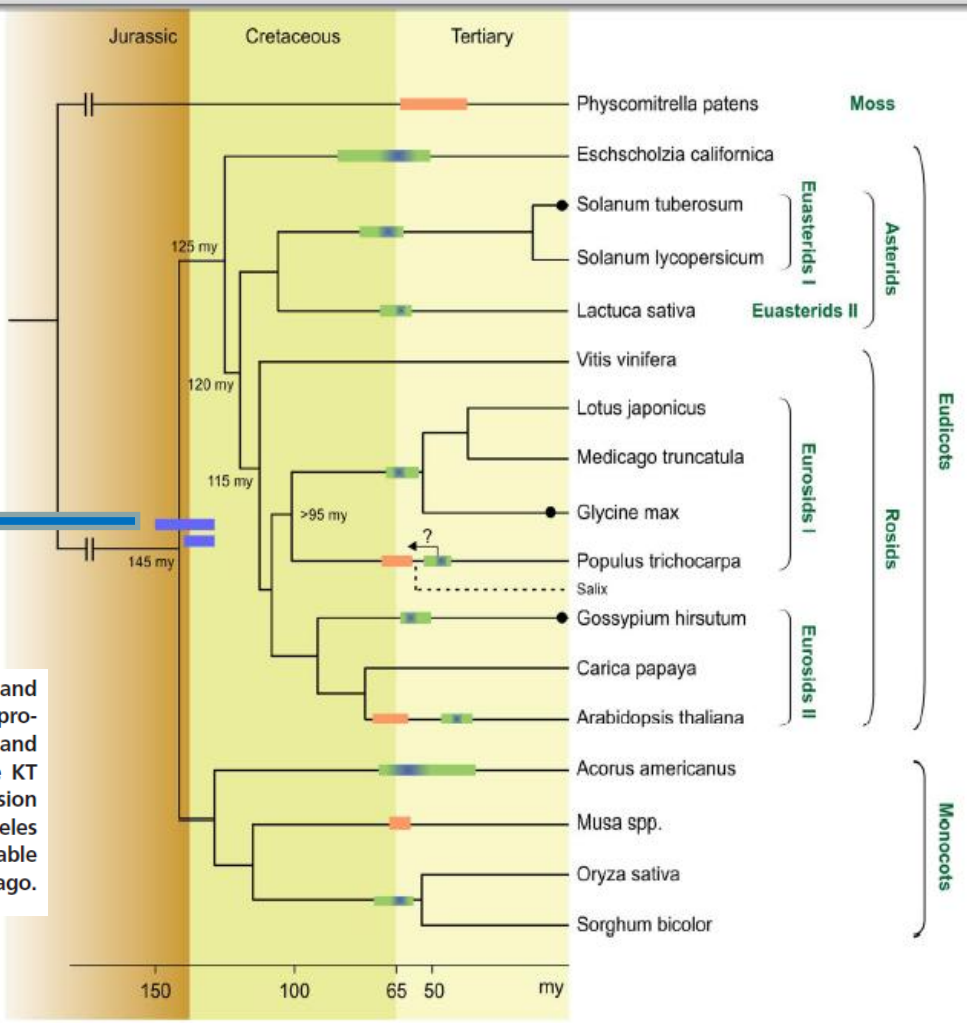


Fig. 3. Phylogenetic tree of flowering plants (eudicots and monocots) for which the genome sequence has been determined or for which large EST collections are available. WGDs are indicated by green bars depicting the union of their 95% age confidence intervals calculated with various constraints (see Table S1). The dark green portions of the bars are centered on the best age estimates (see Table 1). Orange bars are WGD age estimates from literature. The WGD in poplar [here estimated by including *Manihot* (see Table S1)] has most probably occurred before its divergence of *Salix*, although dating by K_S values and phylogenetic means suggest a younger date, probably due to the slower evolutionary rate in trees (see text and *SI Text* for details). Blue bars denote the hexaploid nature of the ancestral eudicot genome (5, 26). The black dots indicate very recent polyploidy events, ≈1–2 mya in *G. hirsutum*, <10 mya in *Solanum tuberosum*, and 10–15 mya in *Glycine max*. The resulting tetraploids have not or only partially diploidized so far.

Genome Biology

RESEARCH HIGHLIGHT

A mystery unveiled

Van de Peer 2011

limite Cretáceo-Terciário

- **evento hexaplóide**
- eventos de duplicação previamente reportados (e.g. Cui et al. 2006)
- 2 grupos de WGDs (whole-genome duplications) antigos: 319 m.a. e 192 m.a. (Jiao et al. 2011)

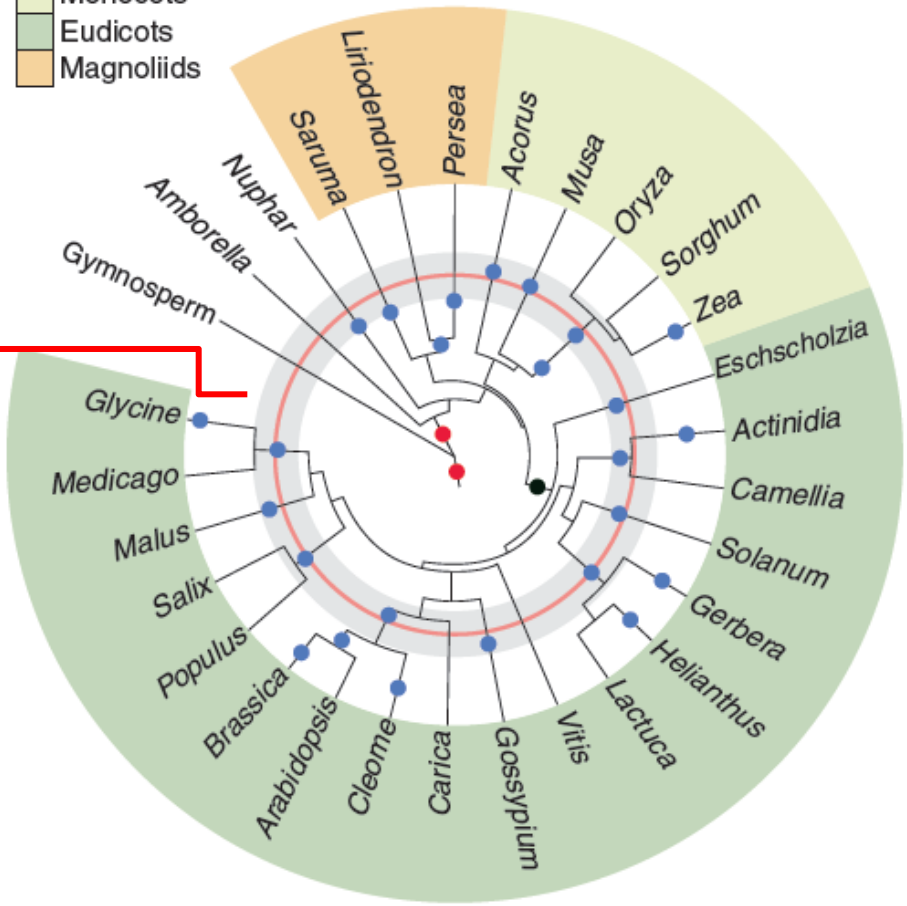


Figure 1. Pruned phylogenetic tree of seed plants. Blue circles represent duplication events previously proposed (for example, [10]). The black circle denotes the hexaploidy event shared by most, if not all, eudicots. The red line represents the Cretaceous and Tertiary boundary (KT). Although the dating of several of the whole genome duplications (WGDs) is still controversial, many of the more recent WGDs might be clustered in time close to the KT extinction event (grey area) [9]. The two newly discovered ancient WGDs discussed in Jiao *et al.* [1] are shown as red circles.

Soltis & Burleigh 2009

PNAS

Surviving the K-T mass extinction: New perspectives of polyploidization in angiosperms

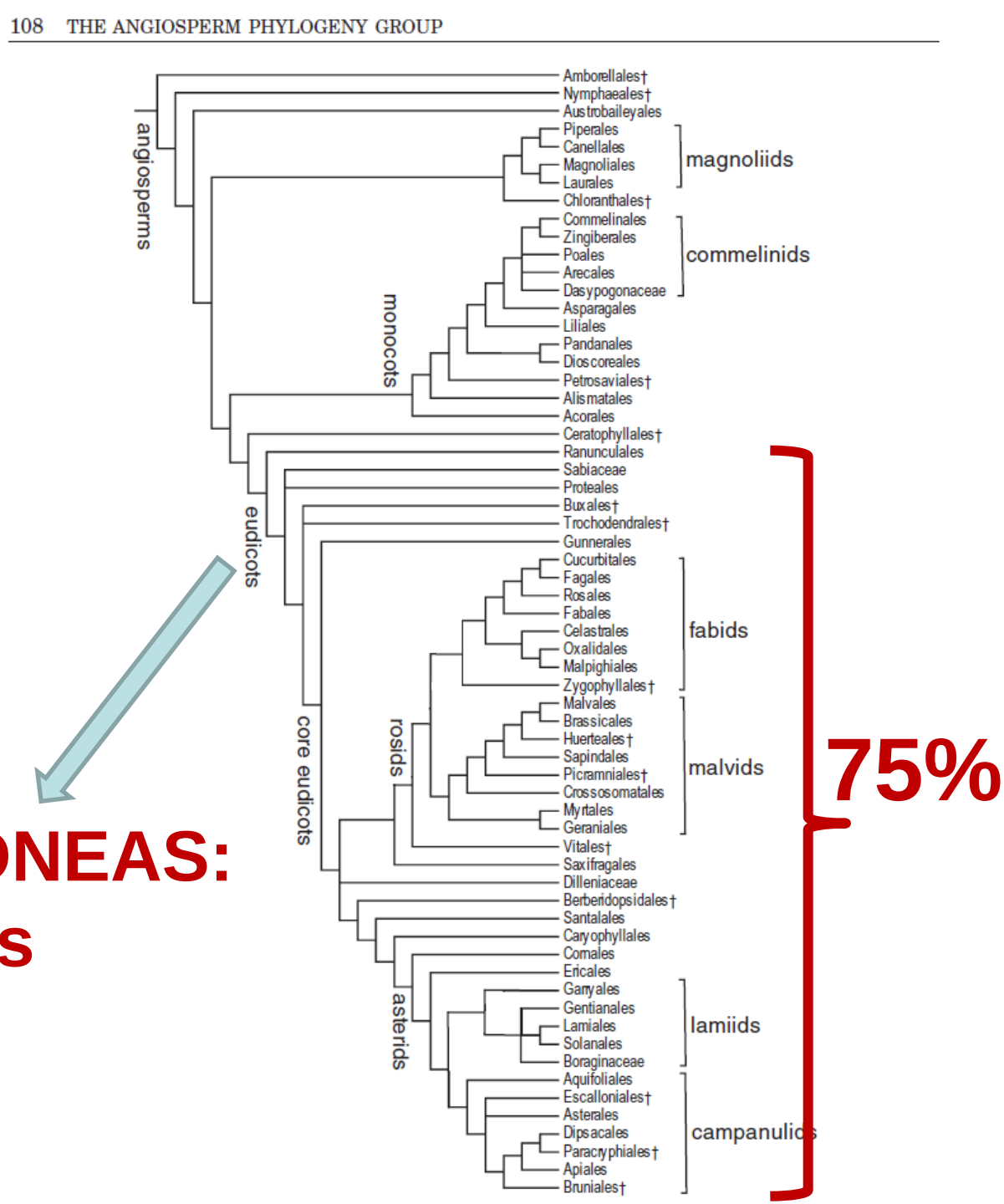
Douglas E. Soltis[1] and J. Gordon Burleigh
Department of Biology, University of Florida, Gainesville, FL 32611

Although it has long been recognized that polyploidy (now often referred to as genome doubling) has played a major correspondence of ancient polyploidy events to the origin of many species-rich plant clades, including Fabaceae, Asteraceae, eudicots, monocots, and even (e.g., refs. 6, 14, and 15). Hc can be difficult to interpret t distribution graphs (14), and rate heterogeneity among lir

APG-III 2009

18S rDNA
***rbc*L**
atp*B*
***atp*1**
***mat*R**

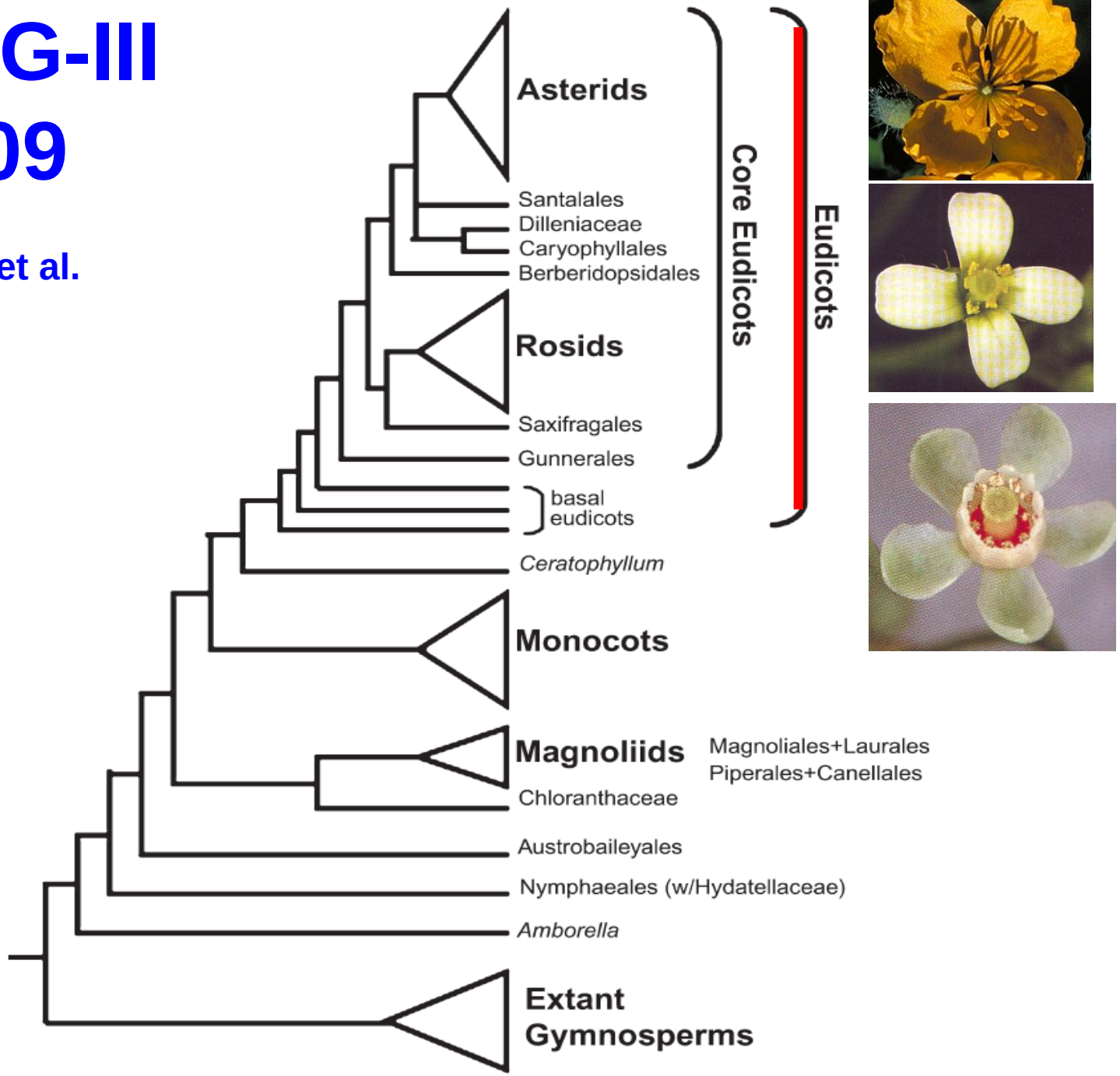
+ 61 genes de 45 táxons

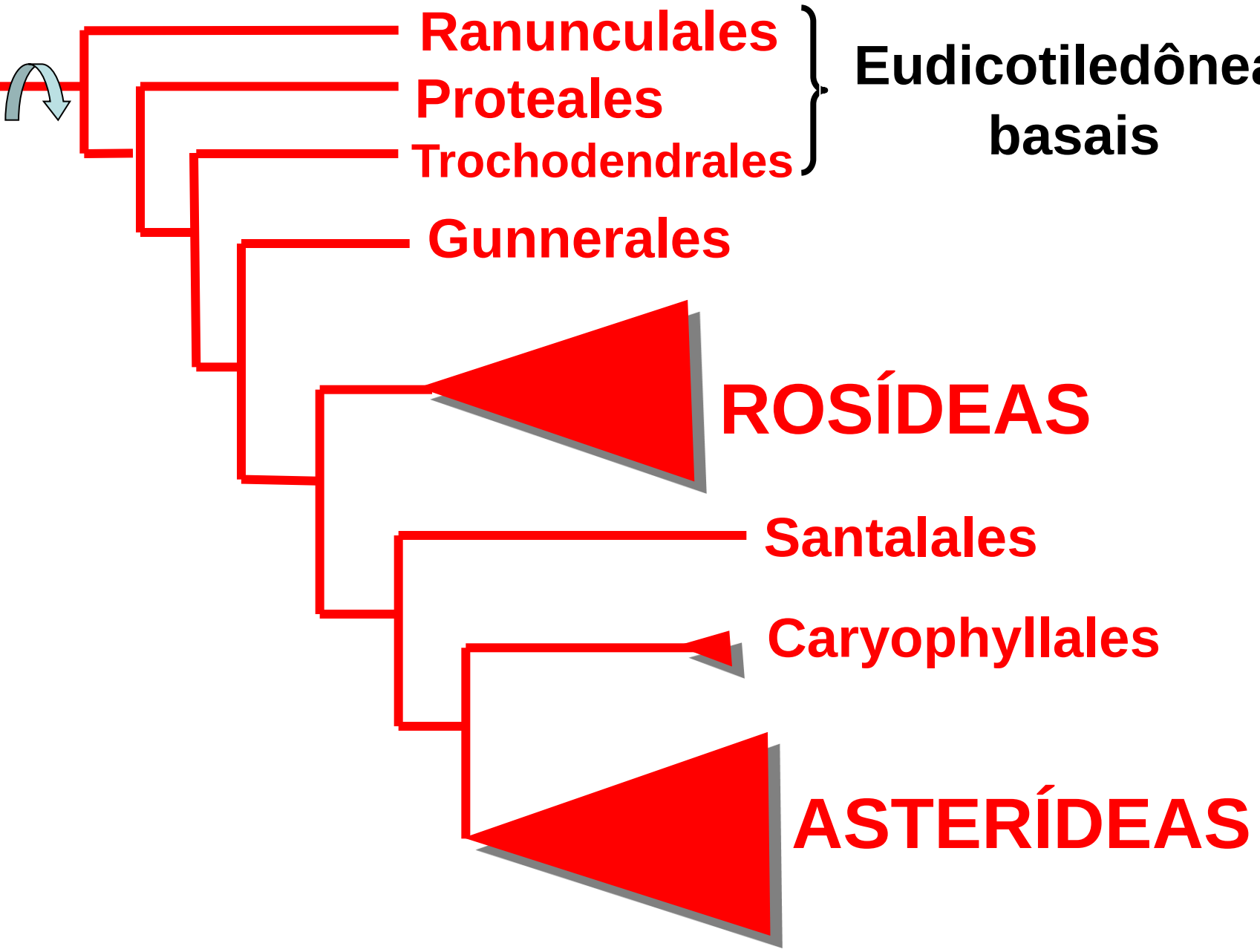


EUDICOTILEDÔNEAS:
41 ordens

APG-III 2009

Soltis et al. 2009




Ranunculales
Proteales
Trochodendrales
Eudicotiledôneas basais
Gunnerales
ROSÍDEAS
Santalales
Caryophyllales
ASTERÍDEAS

Ranunculales

Proteales

Trochodendrales

Gunnerales

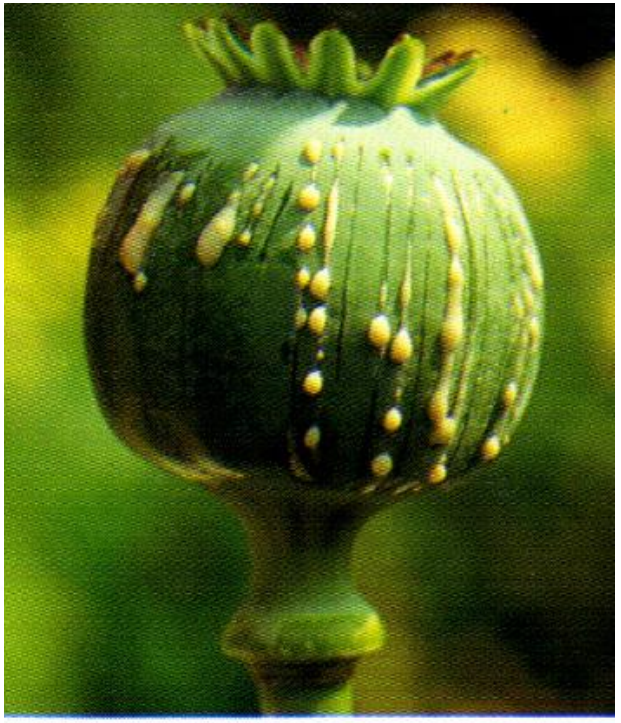
ROSÍDEAS

Santalales

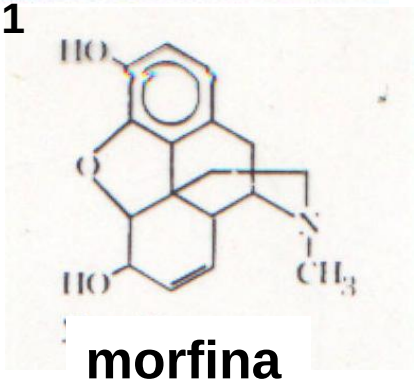
Caryophyllales

ASTERÍDEAS

RANUNCULALES
PAPAVERACEAE



Schultes et al. 2001



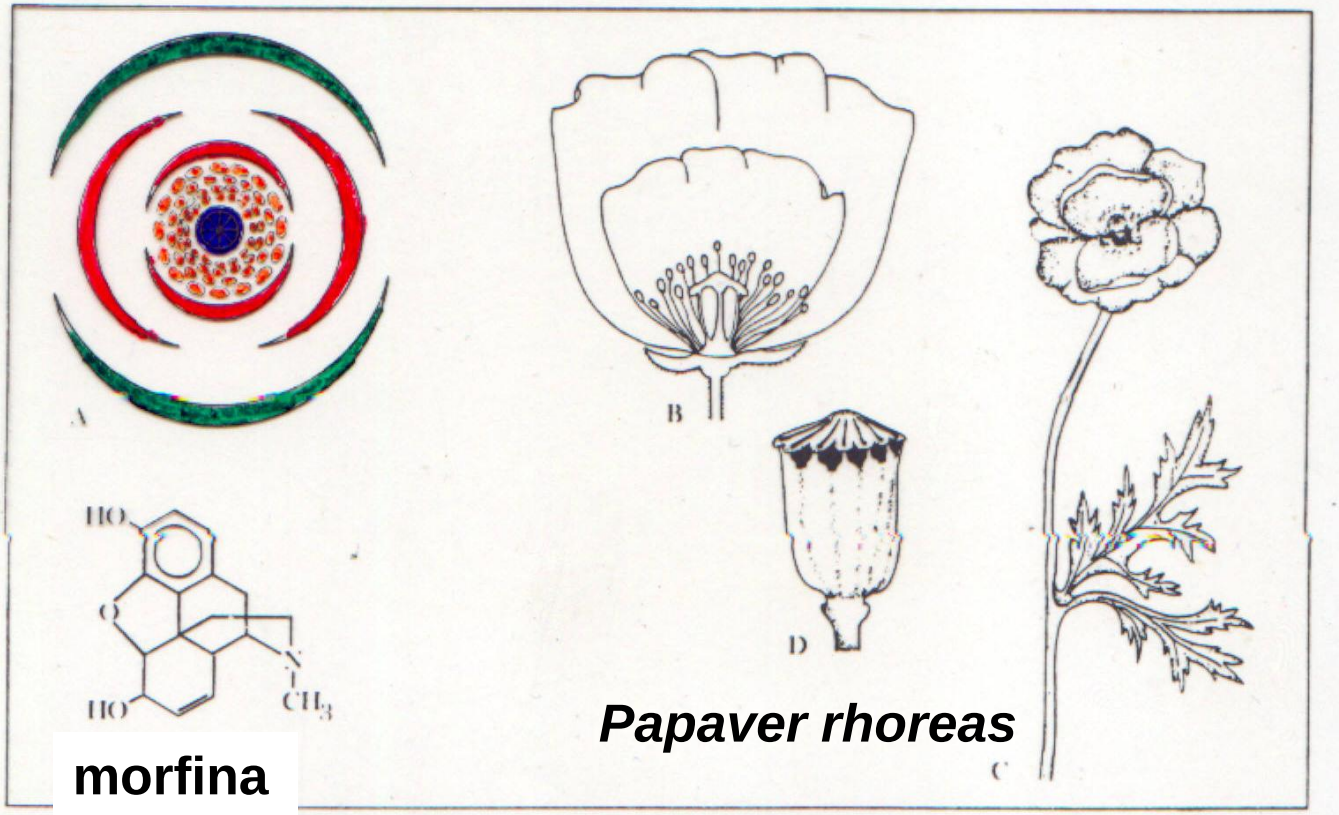
morfina

Papaveraceae.

Papaver somniferum L.

Papaver somniferum

RANUNCULALES - PAPAVERACEAE



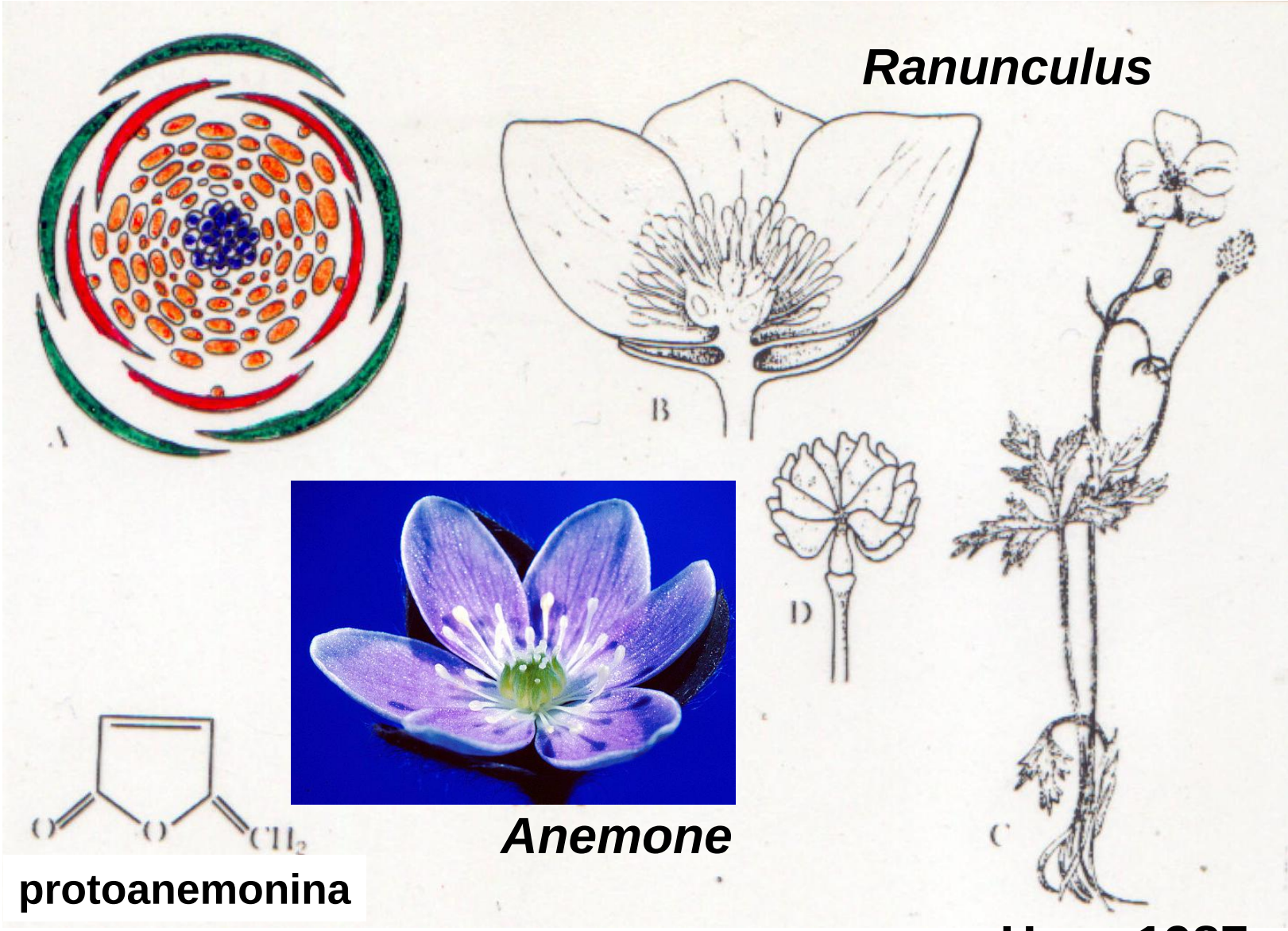
morfina

Papaver rhoreas

Papaver somniferum

Hess 1987

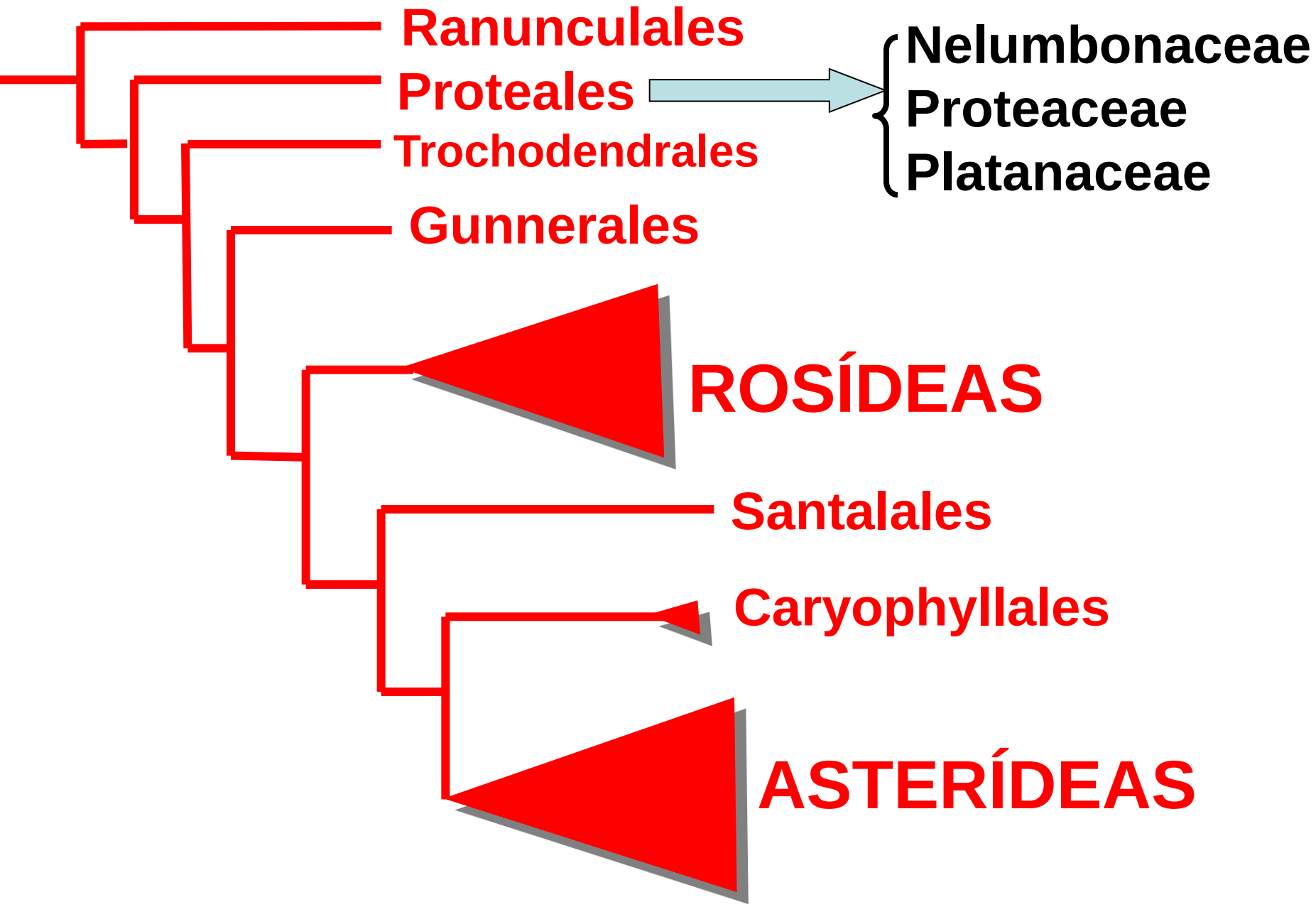
RANUNCULALES - RANUNCULACEAE



Anemone

protoanemonina

Hess 1987


Ranunculales
Proteales
Trochodendrales
Gunnerales
Nelumbonaceae
Proteaceae
Platanaceae
ROSÍDEAS
Santalales
Caryophyllales
ASTERÍDEAS

NELUMBONACEAE

por insetos.

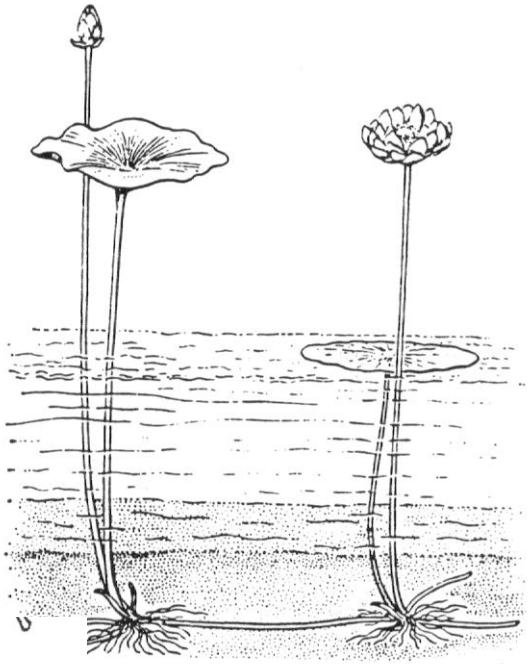
Misteriosa e quentinha

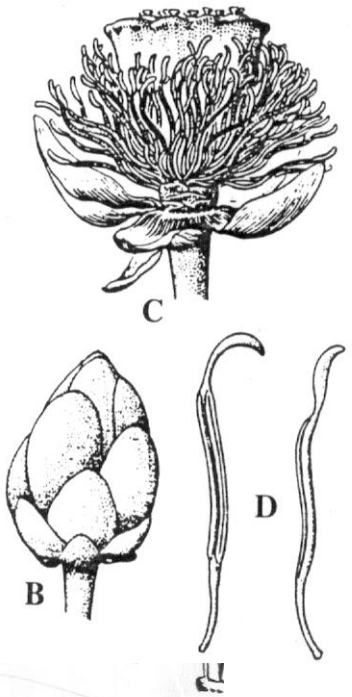
As flores brancas ou rosadas do lótus são grandes e perfumadas. Nascem na Austrália e em países da Ásia, onde são sagradas para certos povos. A flor de lótus se mantém sempre aquecida. Provavelmente faz isso para atrair besouros, que param no miolo para namorar e ficam presos à noite, quando ela se fecha. De manhã, saem espalhando pólen.

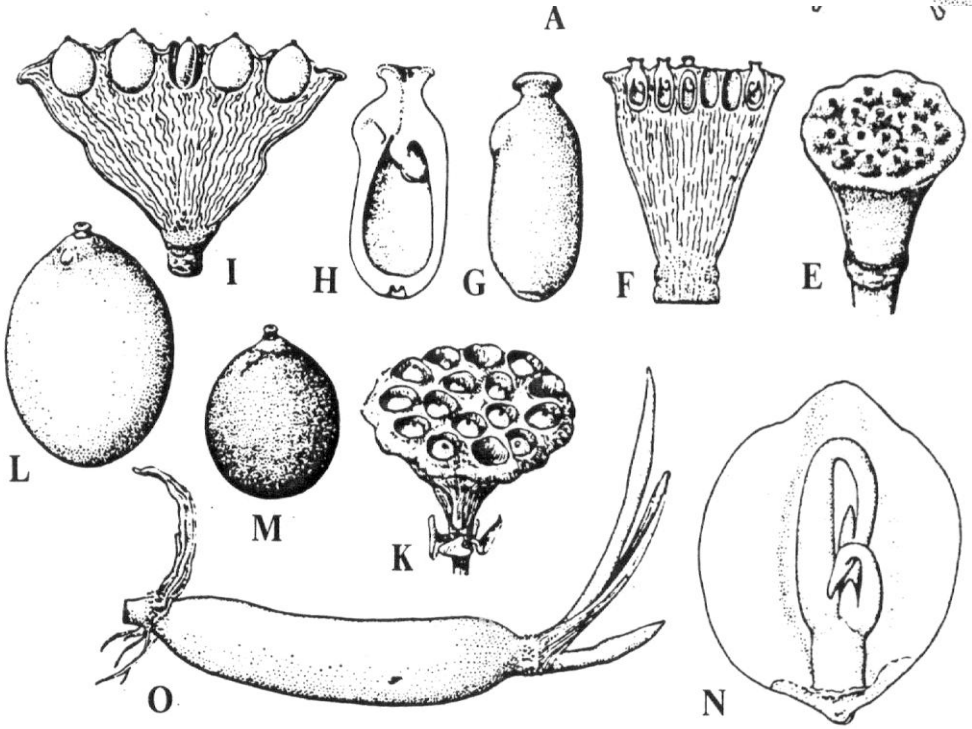
PROTEALES

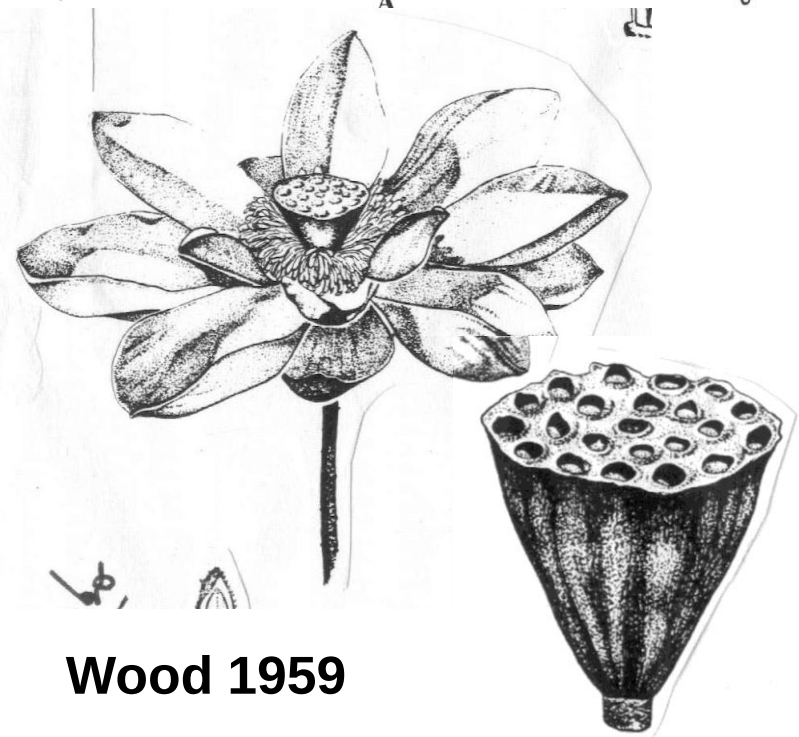
NELUMBONACEAE

Nelumbo





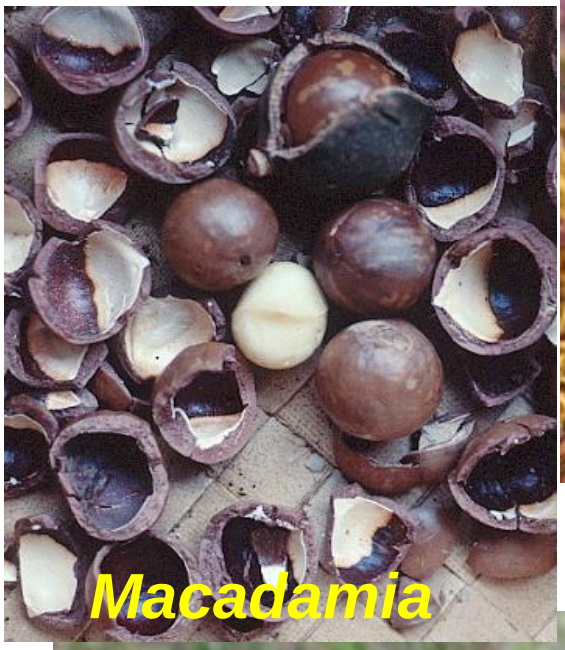




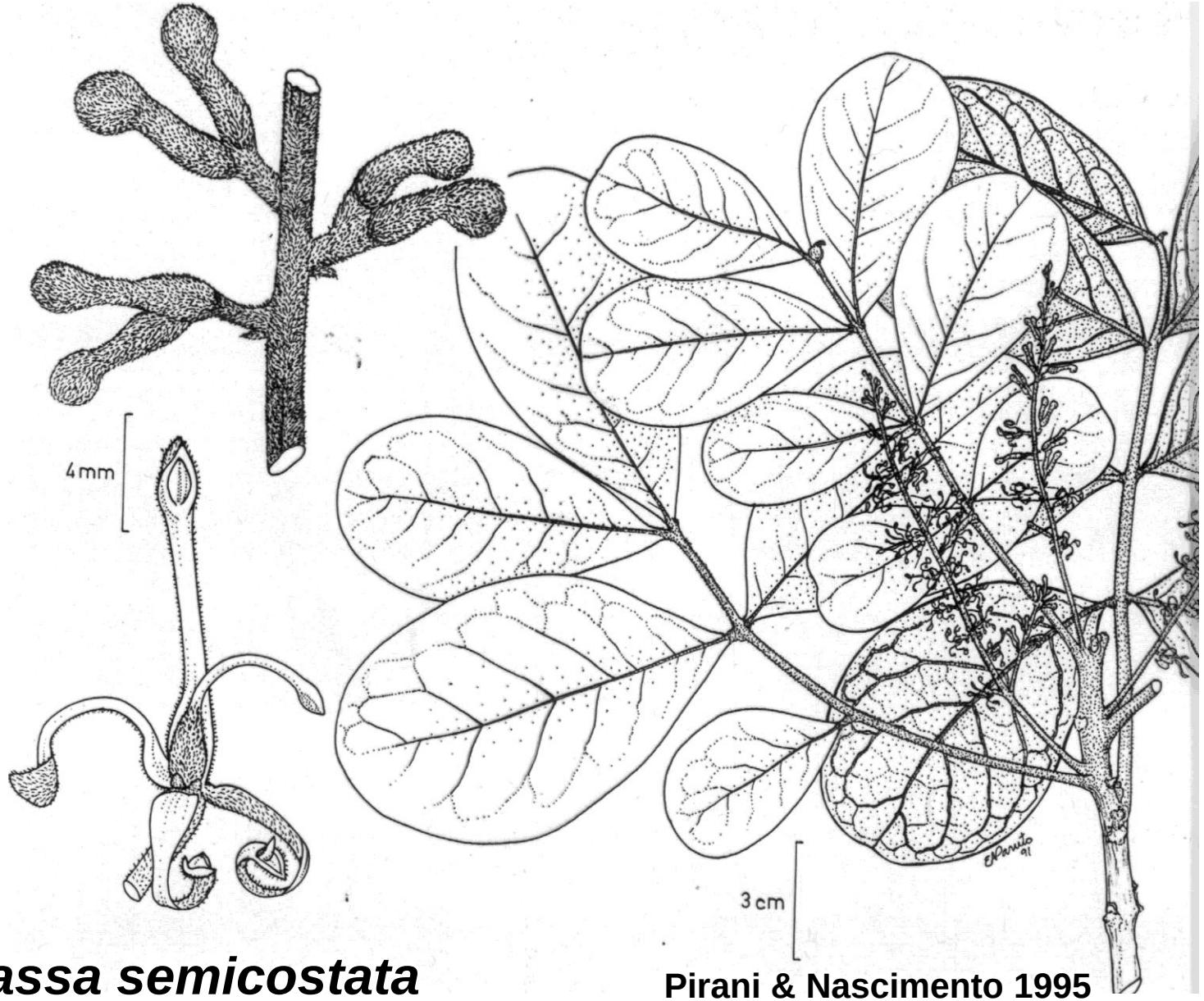
Wood 1959

PROTEALES

PROTEACEAE



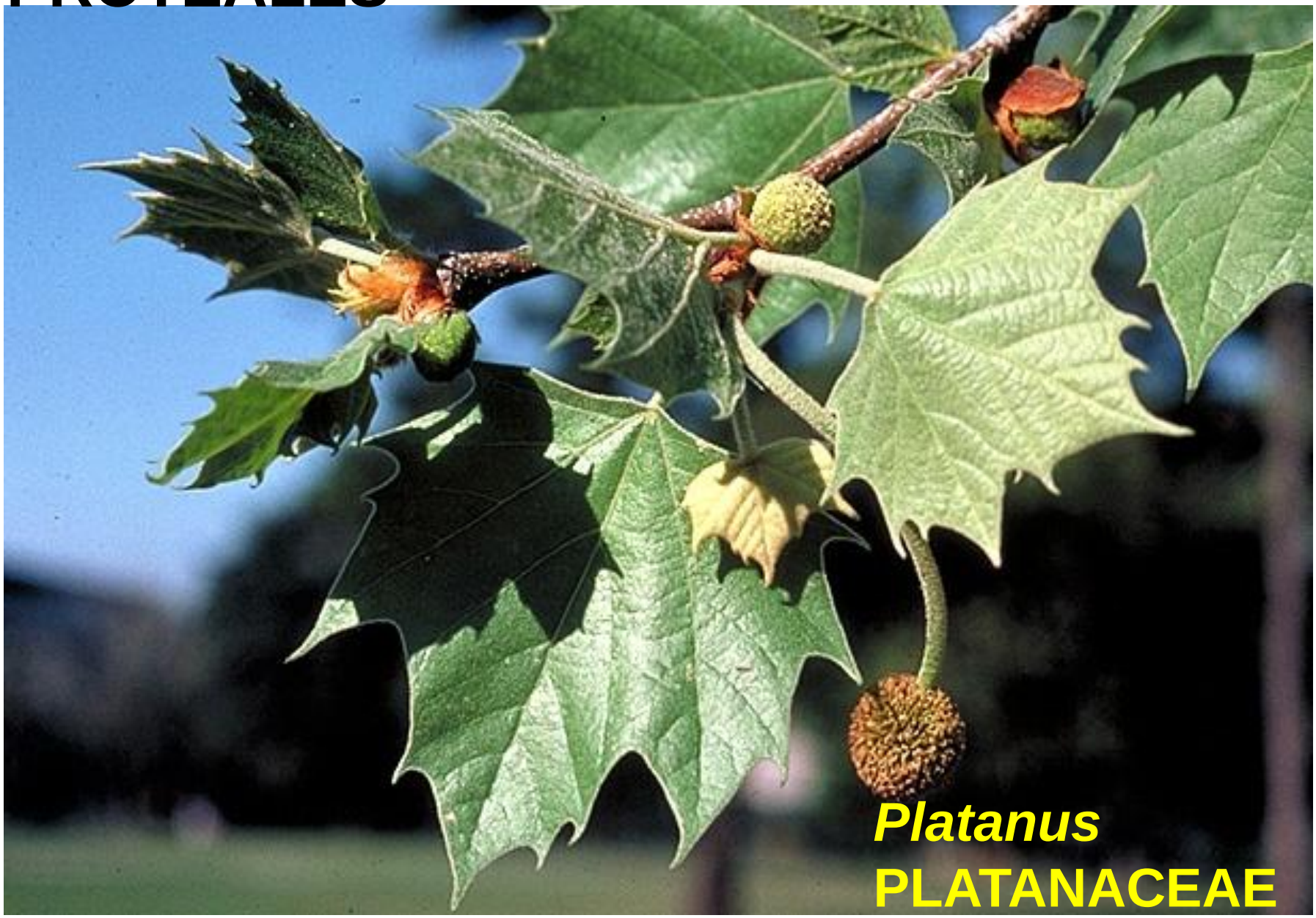
PROTEALES PROTEACEAE

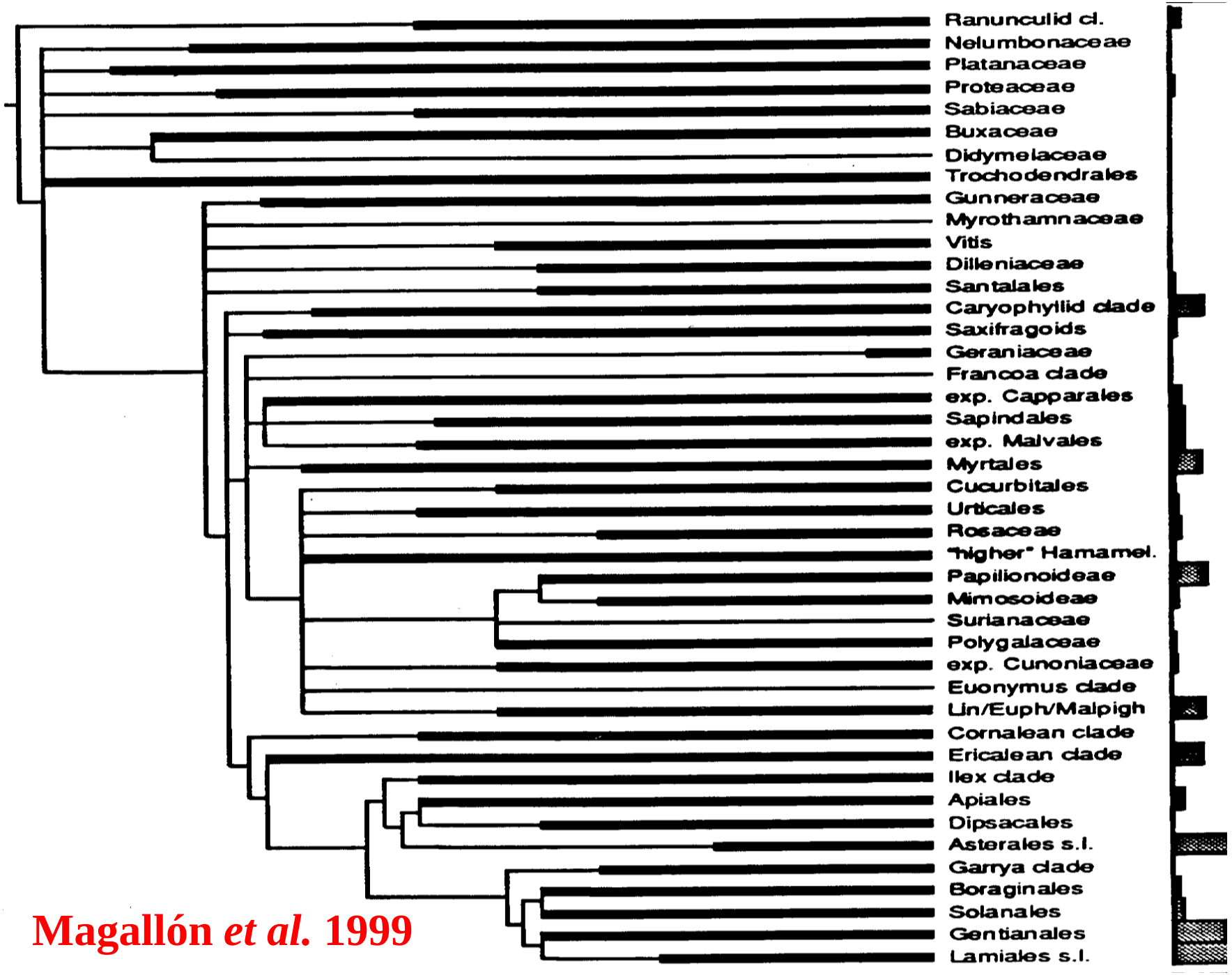


Euplassa semicostata

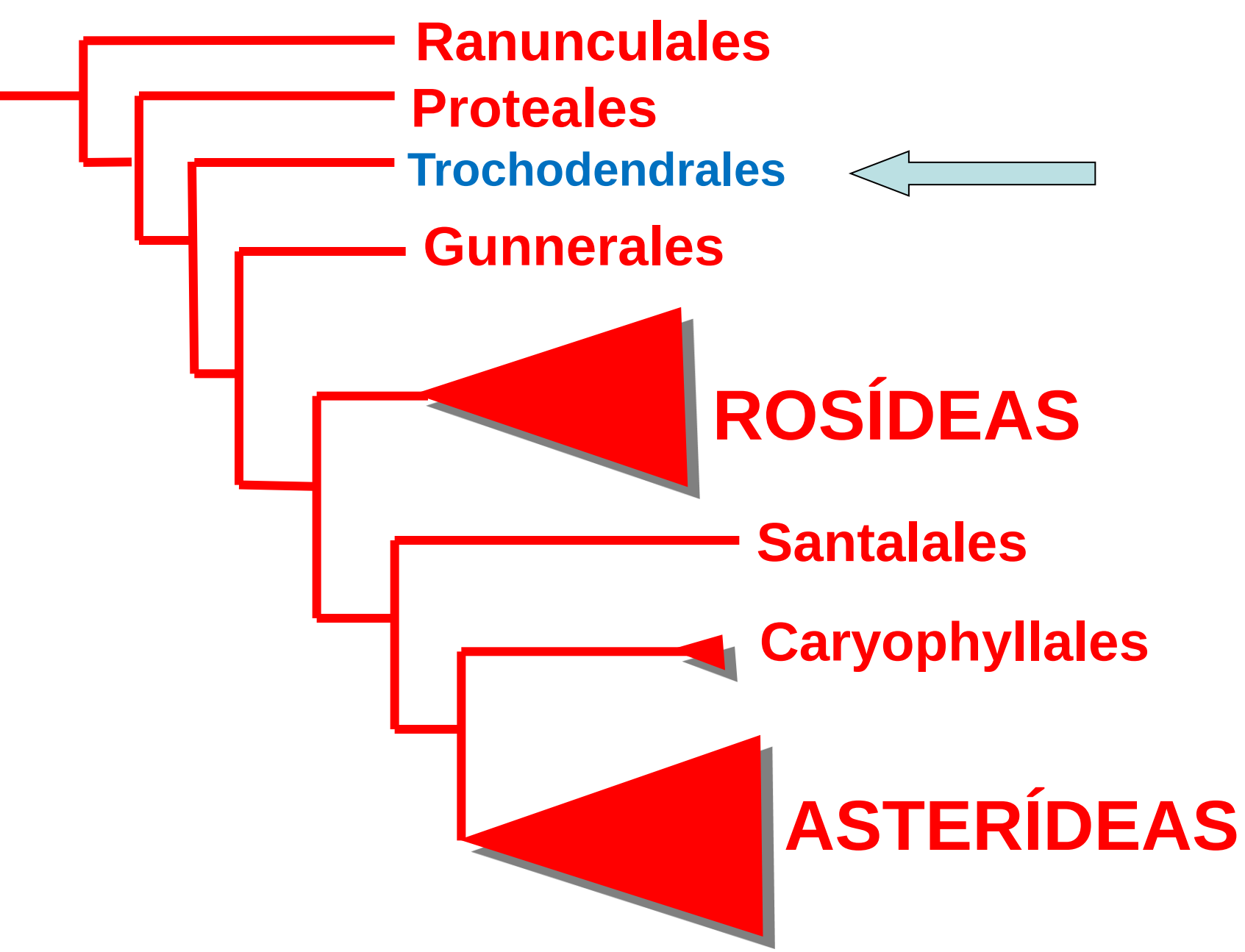
Pirani & Nascimento 1995

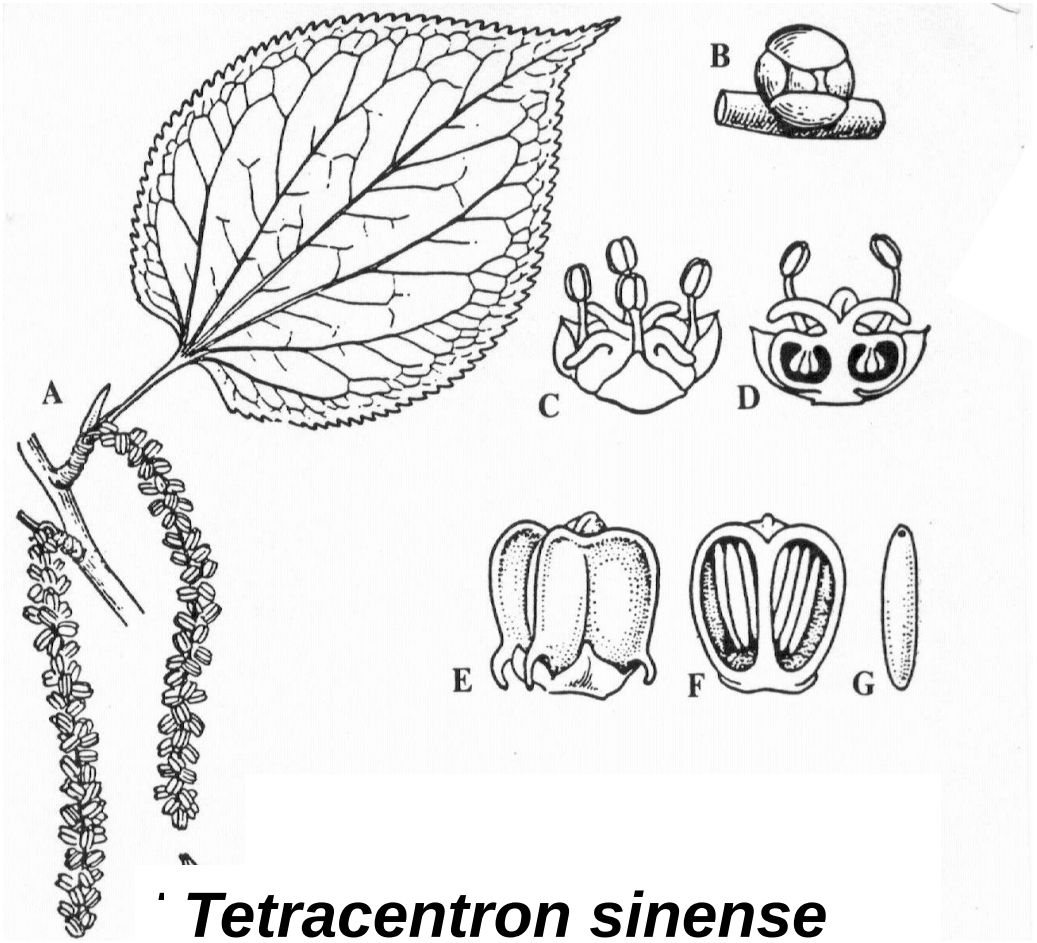
PROTEALES



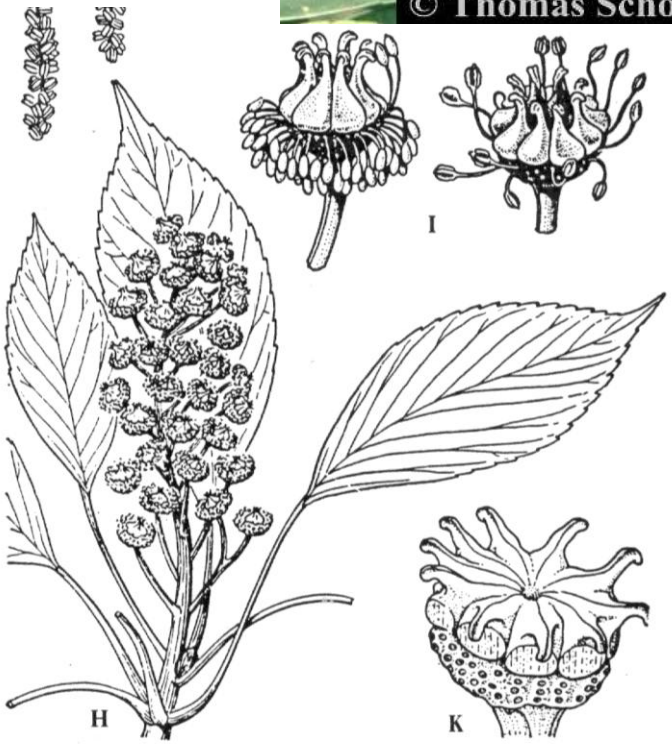


Magallón *et al.* 1999


Ranunculales
Proteales
Trochodendrales
Gunnerales
ROSÍDEAS
Santalales
Caryophyllales
ASTERÍDEAS



Tetracentron sinense

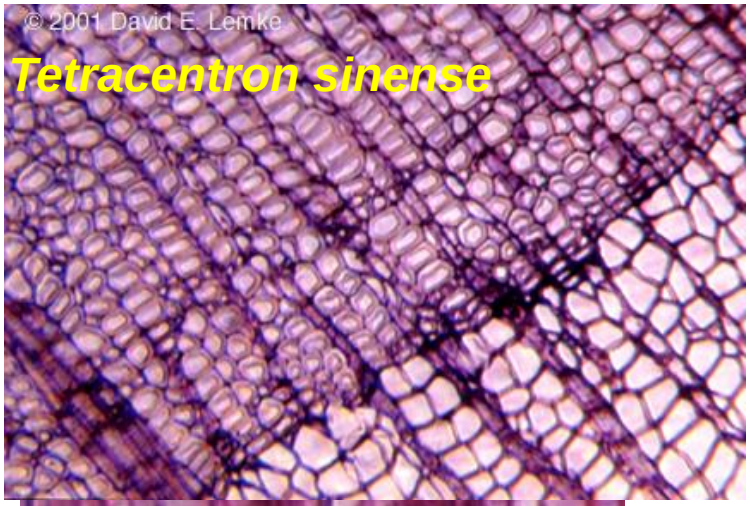


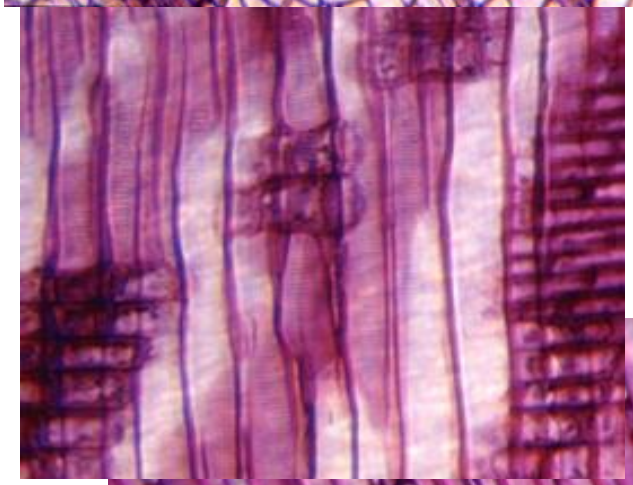
Trochodendron aralioides

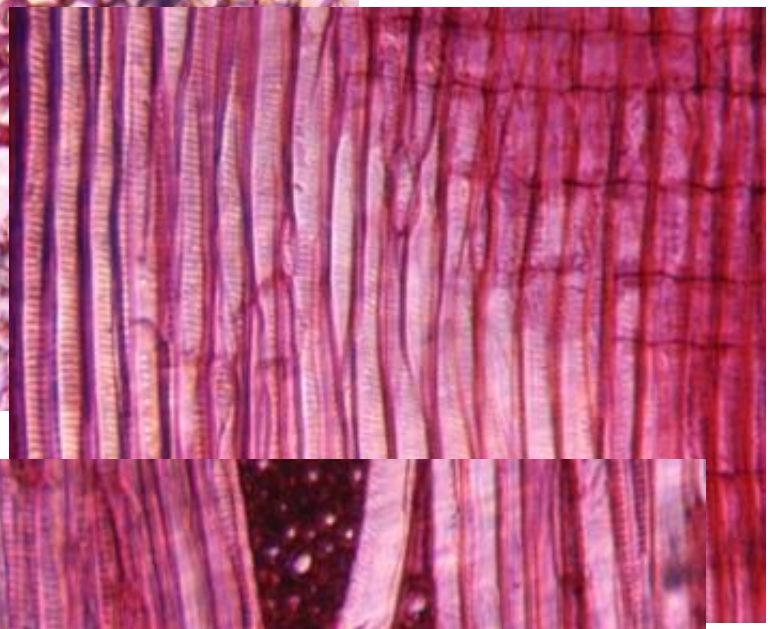
Kubitzki *et al.* 1993

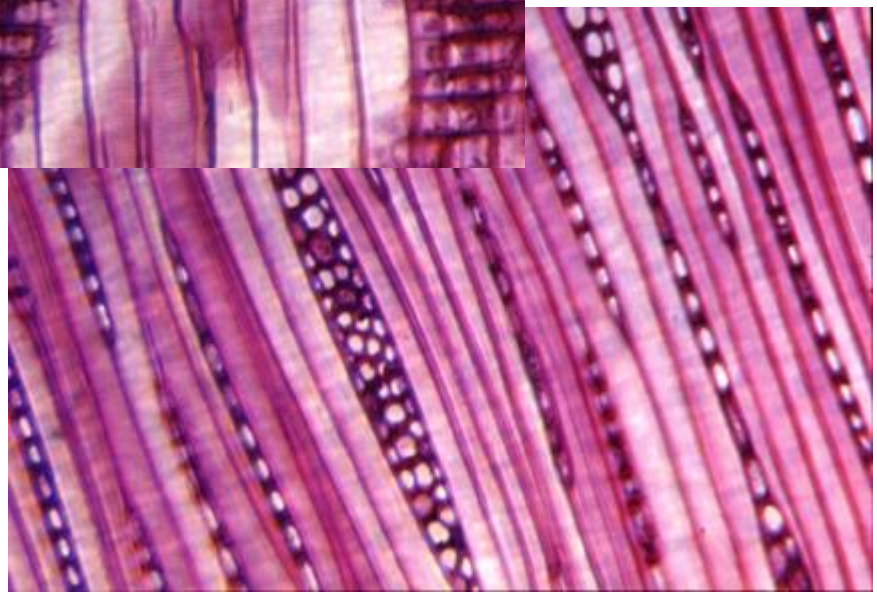
TROCHODENDRACEAE

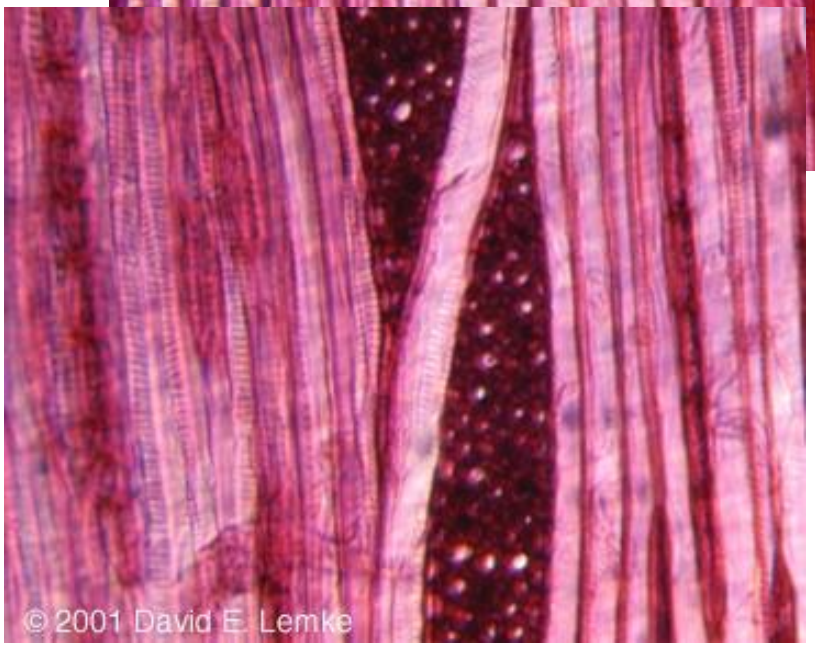
TROCHODENDRACEAE











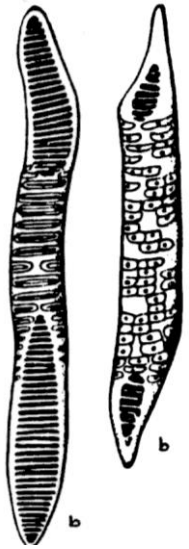
Amborellales

Nymphaeales

Austrobaileyales

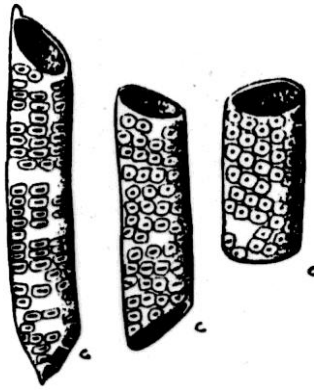
Chloranthales

Magnoliídeas



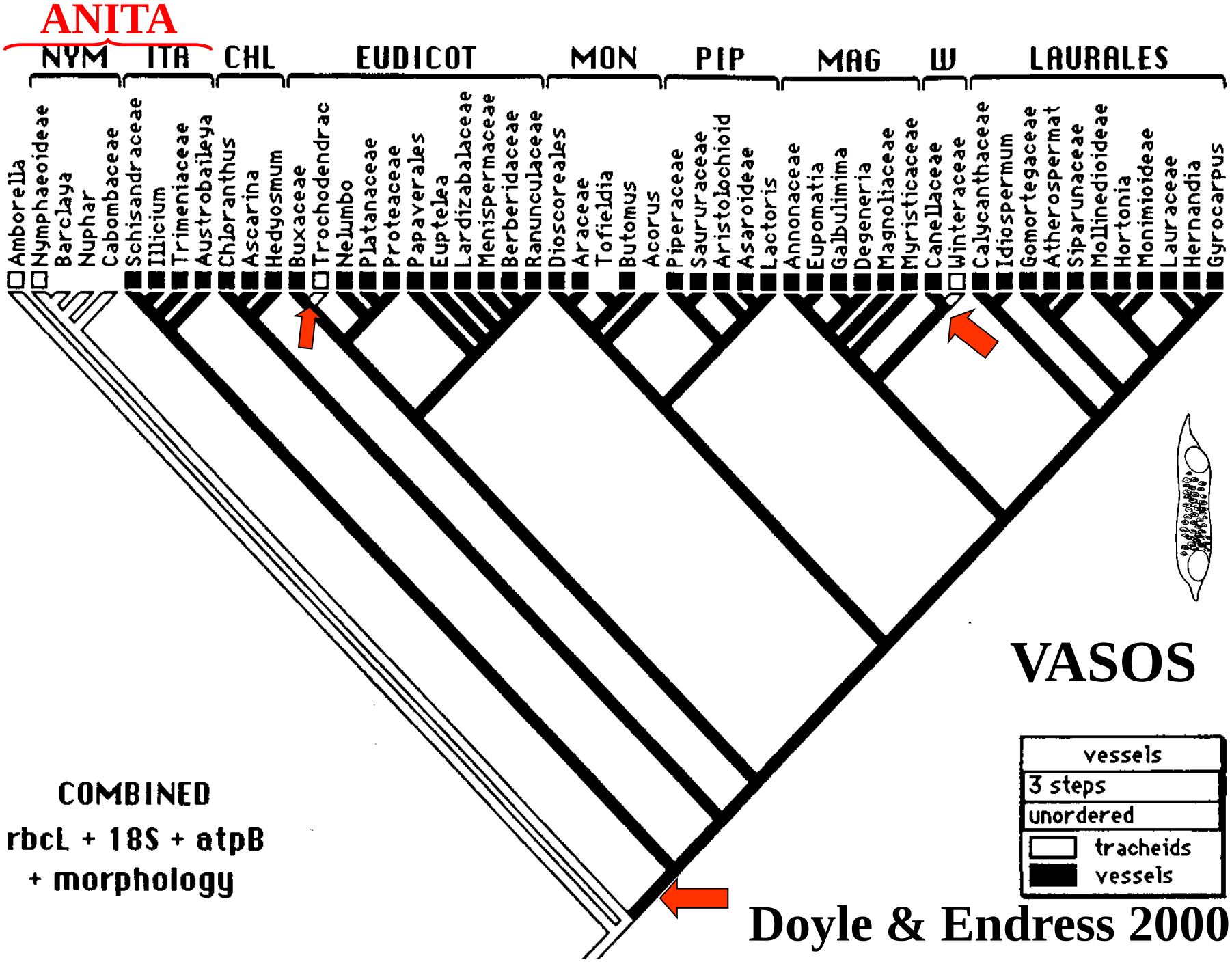
Monocotiledôneas

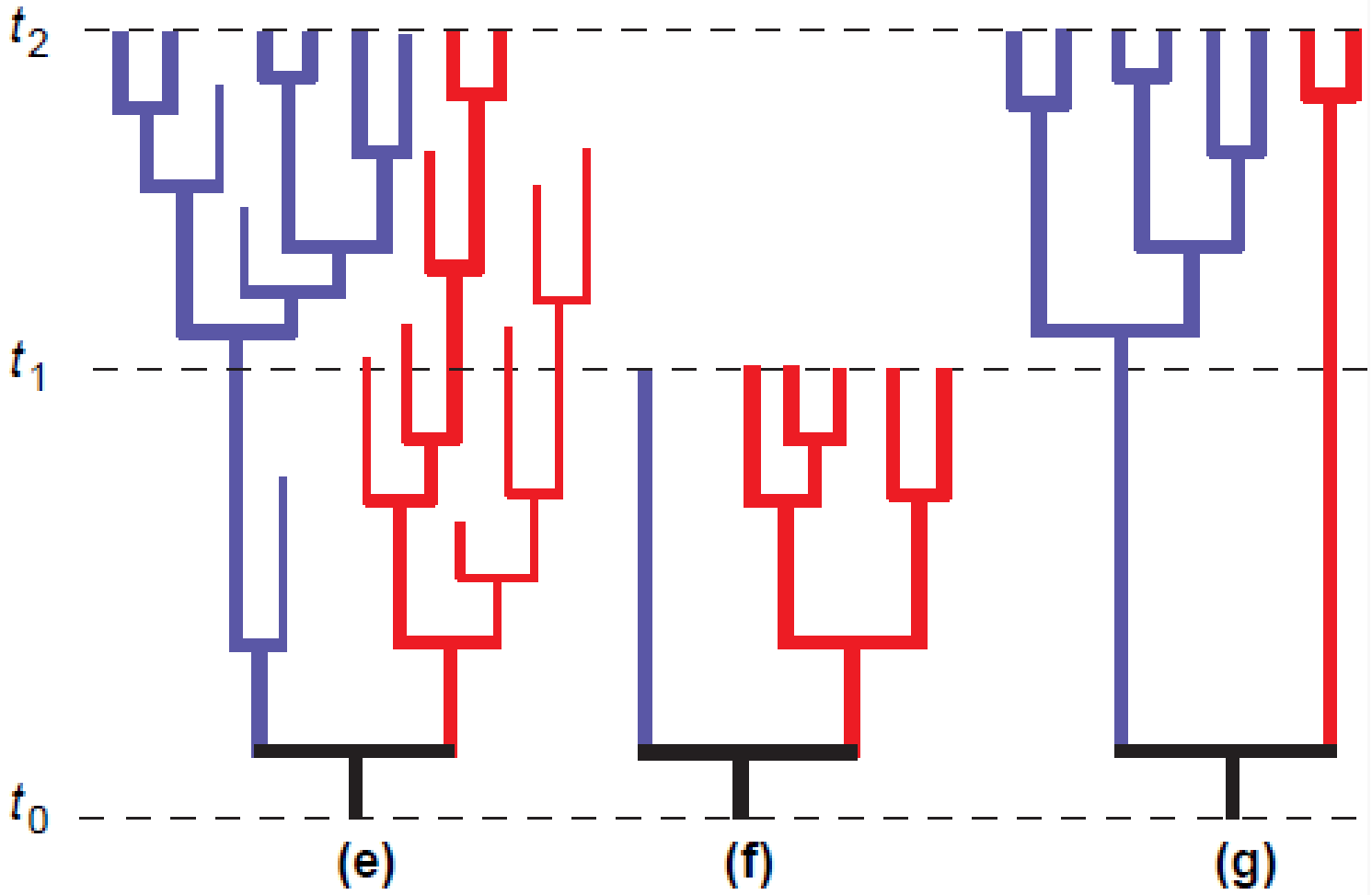
Ceratophyllales



Eudicotiledôneas

APG III 2009


ANITA
NYM
ITA
CHL
EUDICOT
MON
PIP
MAG
W
LAURALES
Amborella
Nymphaeoideae
Barclaya
Nuphar
Cabombaceae
Schisandraceae
Illicium
Trimeniaceae
Austrobaileya
Chloranthus
Ascarina
Hedyosmum
Buxaceae
Trochodendrac
Nelumbo
Platanaceae
Proteaceae
Papaverales
Eupteleа
Lardizabalaceae
Menispermaceae
Berberidaceae
Ranunculaceae
Dioscoreales
Araceae
Tofieldia
Butomus
Acorus
Piperaceae
Saururaceae
Aristolochioid
Asaroideae
Lactoris
Annonaceae
Eupomatia
Galbulimima
Degeneria
Magnoliaceae
Myristicaceae
Canellaceae
Winteraceae
Calycanthaceae
Idiospermum
Gomortegaceae
Atherospermat
Siparunaceae
Mollinedioideae
Hortonia
Monimioideae
Lauraceae
Hernandia
Gyrocarpus
VASOS
COMBINED
rbcL + 18S + atpB
+ morphology
vessels
3 steps
unordered
tracheids
vessels
Doyle & Endress 2000

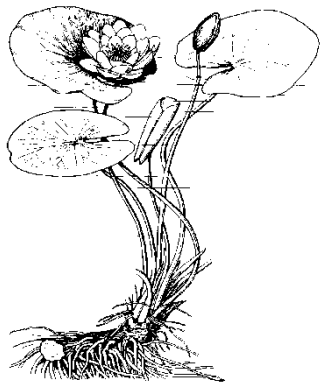


Interpretação de árvores de acordo com a topologia

Crisp & Cook 2005

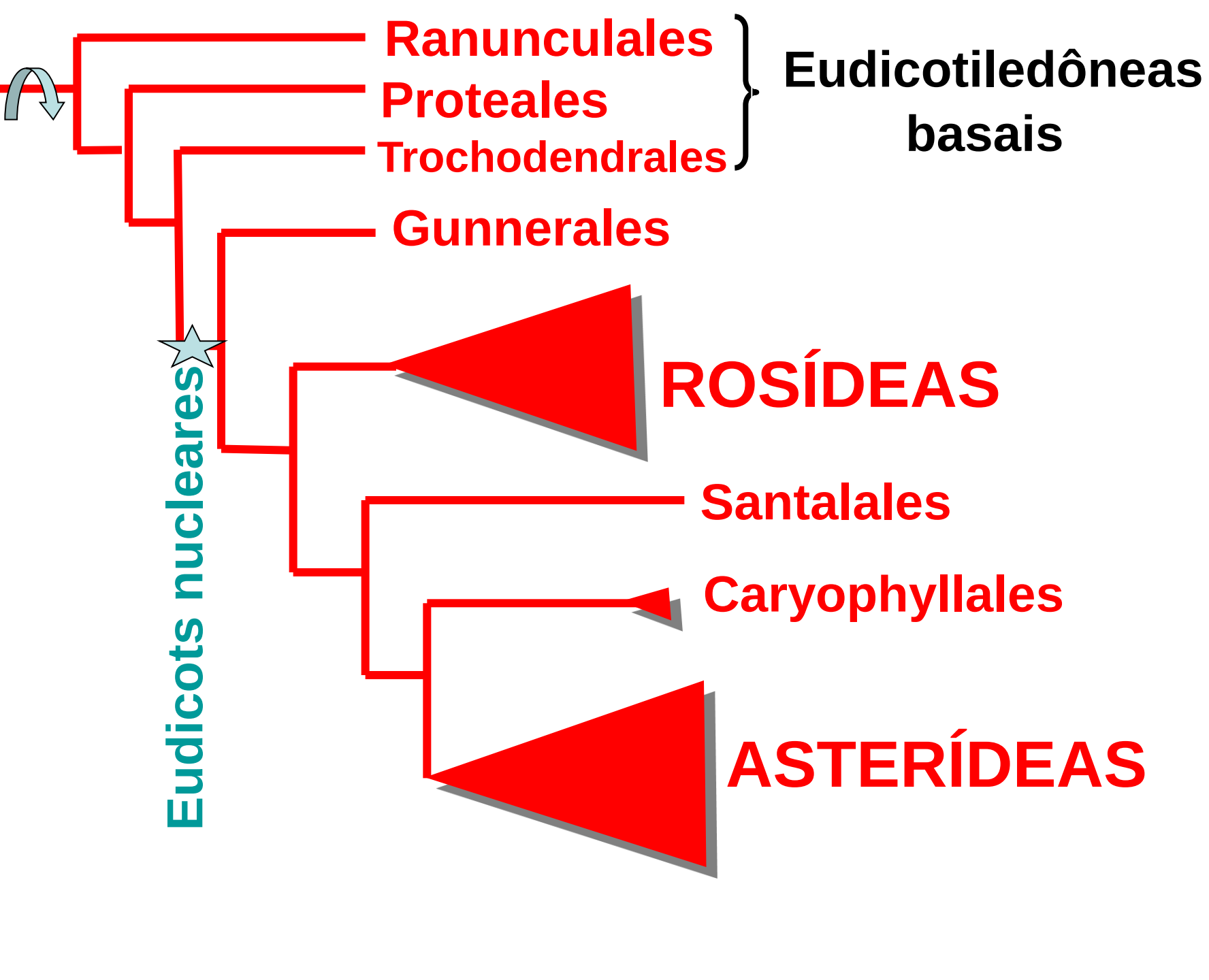
Muitas características ditas "basais" em grupos-irmãos podem ser independentemente derivadas e altamente especializadas.

Exemplos:



As adaptações morfológicas e ecofisiológicas de Nymphaeales ao ambiente aquático.

A perda de vasos em Winteraceae (magnoliídeas) e Trochodendraceae (eudicotiledôneas basais)


Ranunculales
Proteales
Trochodendrales
Eudicotiledôneas basais
Gunnerales
ROSÍDEAS
Santalales
Caryophyllales
ASTERÍDEAS
Eudicots nucleares

Ranunculales

Proteales

Trochodendrales

Gunnerales

Eudicots nucleares

ROSÍDEAS

Santalales

Caryophyllales

ASTERÍDEAS

Gunnerales, Gunneraceae - *Gunnera*

Gunnerales, Gunneraceae – *Gunnera*

Simbiose com *Nostoc*

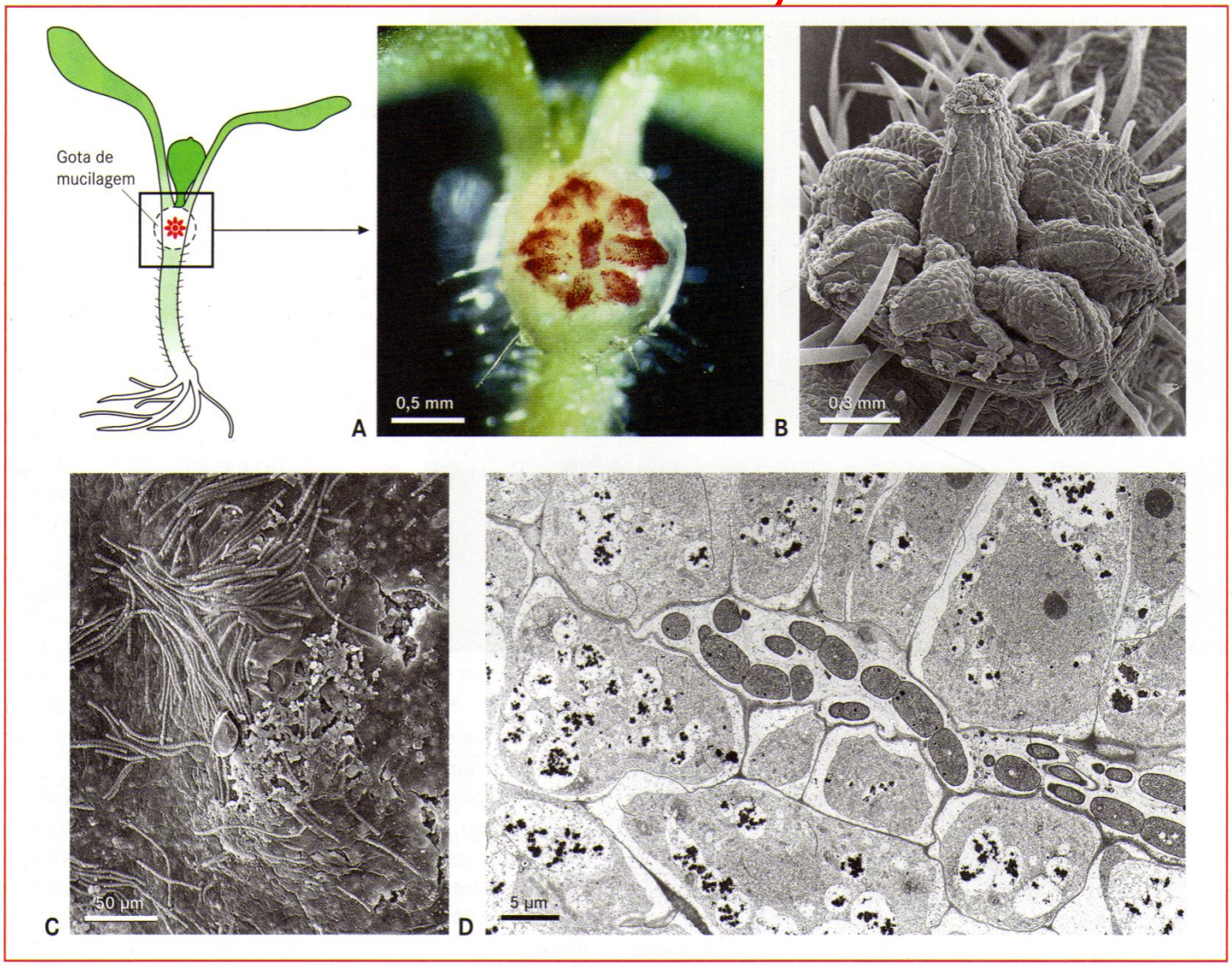


Figura 8-4 Simbiose entre *Gunnera* e *Nostoc*. **A, B** Uma das duas glândulas secretoras de mucilagem no hipocótilo de uma plântula de *Gunnera*, com disposição decussada em relação aos cotilédones. **C** Hormogônios de *Nostoc* sobre a superfície de uma glândula. **D** Corte transversal de uma glândula com hormogônios de *Nostoc* no seu conduto, revestido de células secretoras de mucilagem. (Segundo C. Johansson, gentilmente cedido.)

Amborellales

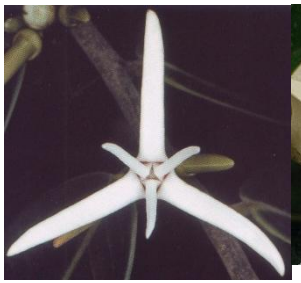
Nymphaeales

Austrobaileyales

APGIII 2009

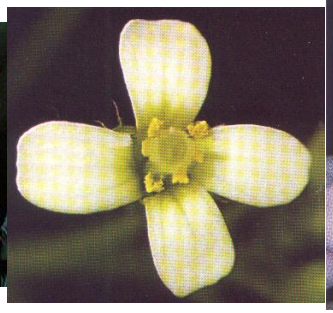
Chloranthaceae

Magnoliídeas



Monocotiledôneas

Eudicotiledôneas



Ranunculales

Proteales

Trochodendrales

Gunnerales

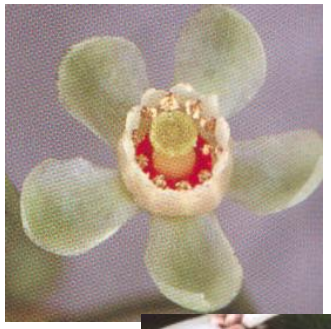
2-meria

Eudicots nucleares

PENTAPETALE

5-meria

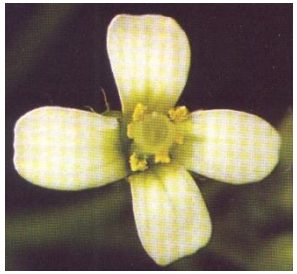
ROSÍDEAS



Santalales

Caryophyllales

ASTERÍDEAS



Ranunculales

Proteales

Trochodendrales

Gunnerales

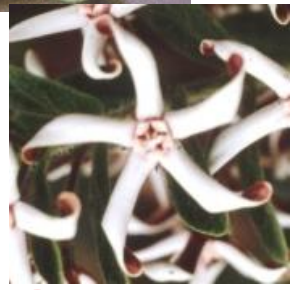
2-meria

ROSÍDEAS

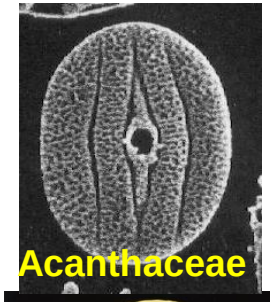
4-5-meria

Santalales

Caryophyllales

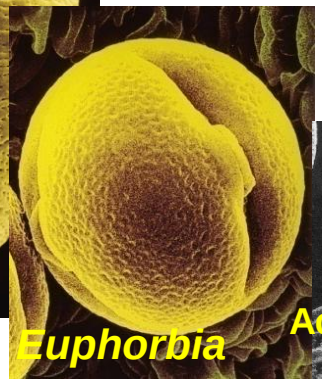


ASTERÍDEAS

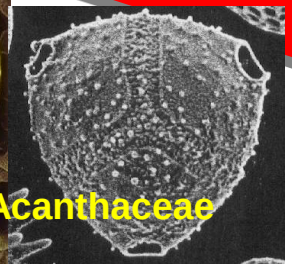


Acanthaceae

Aesculus

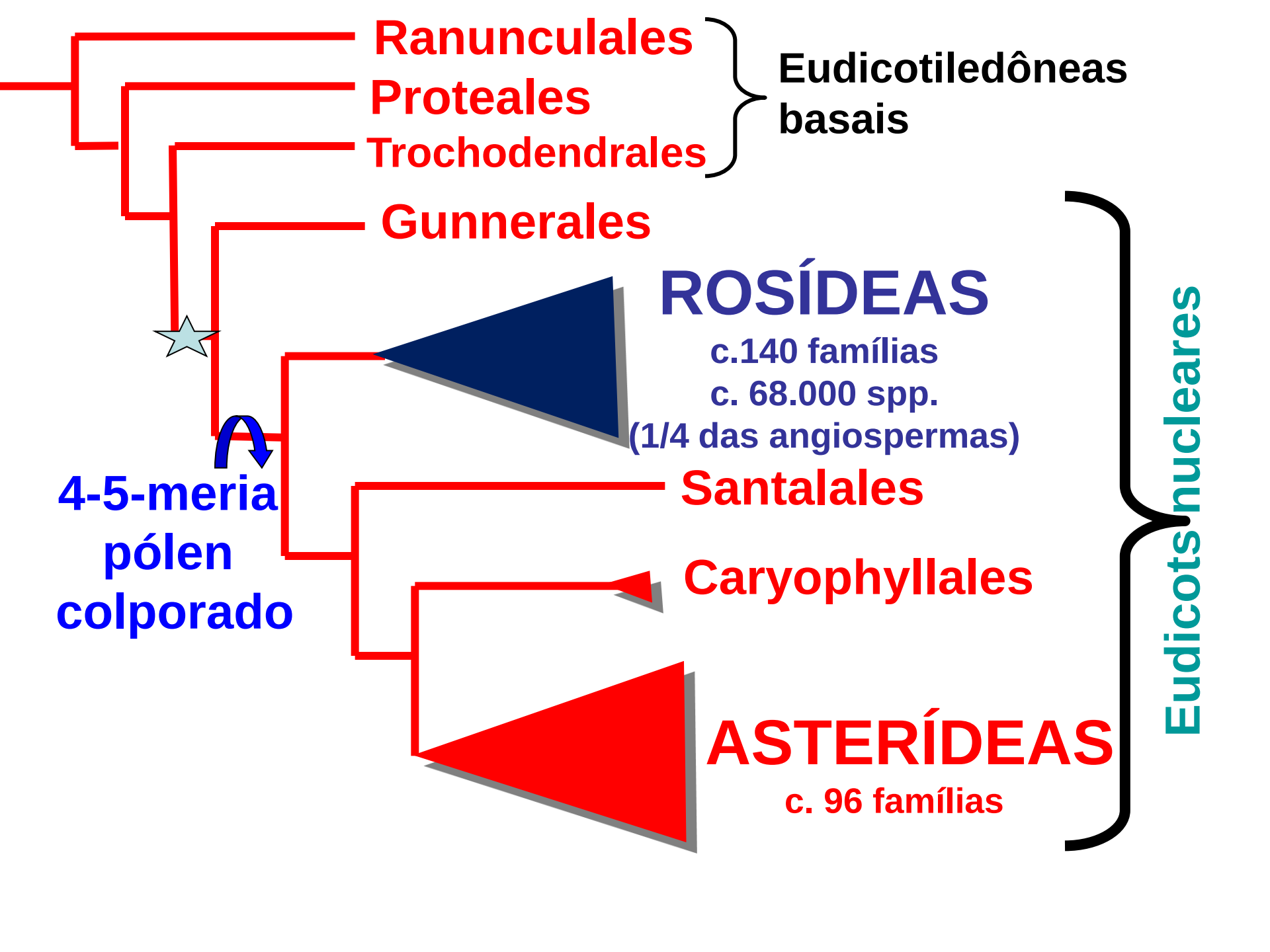


Euphorbia

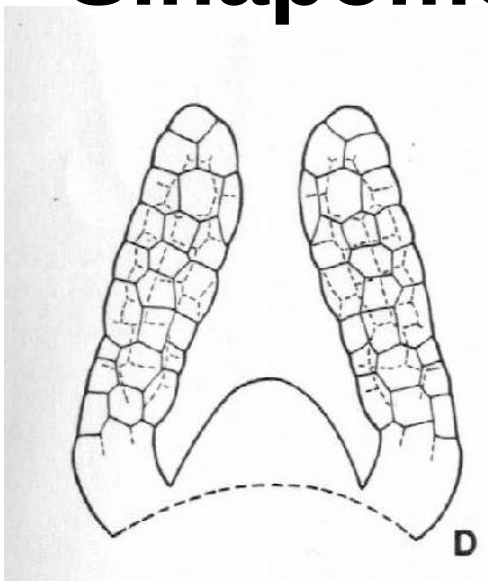


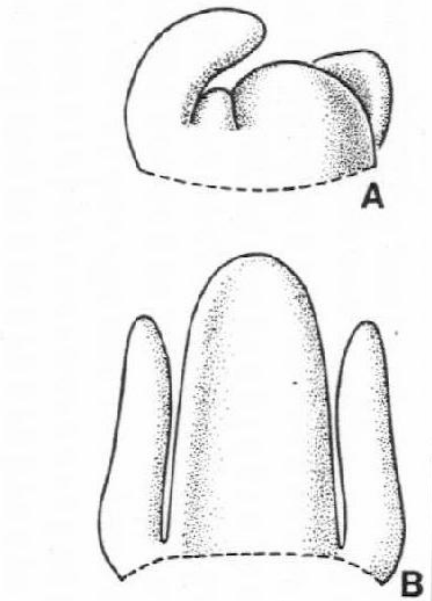
Acanthaceae

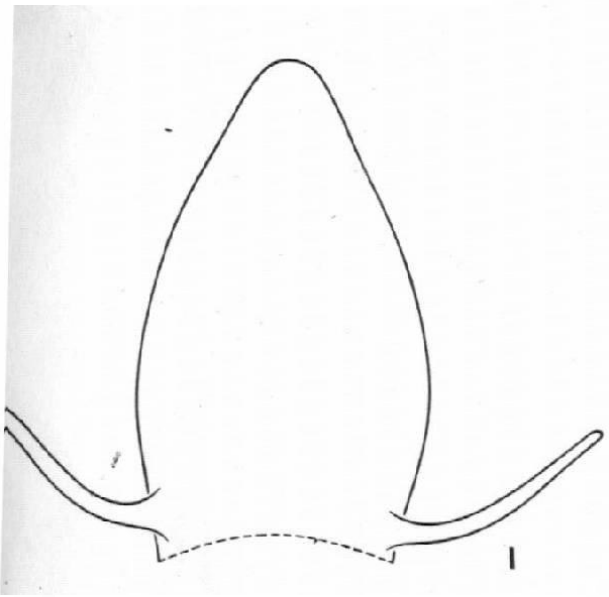
pólen colporado a porado

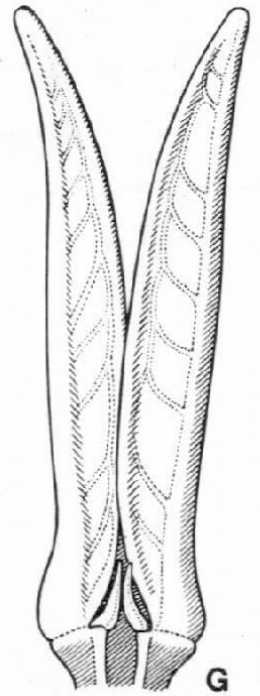

Ranunculales
Proteales
Trochodendrales
Eudicotiledôneas basais
Gunnerales
ROSÍDEAS
c.140 famílias
c. 68.000 spp.
(1/4 das angiospermas)
4-5-meria
pólen
colporado
Santalales
Caryophyllales
ASTERÍDEAS
c. 96 famílias
Eudicots nucleares

Sinapomorfias de ROSÍDEAS

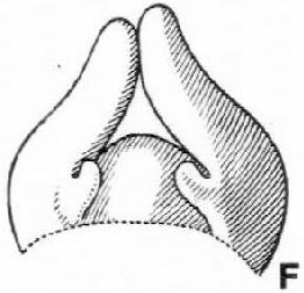






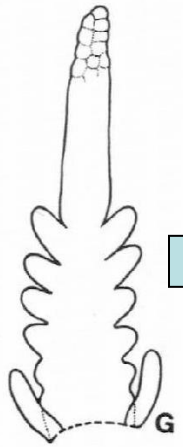


Onagraceae



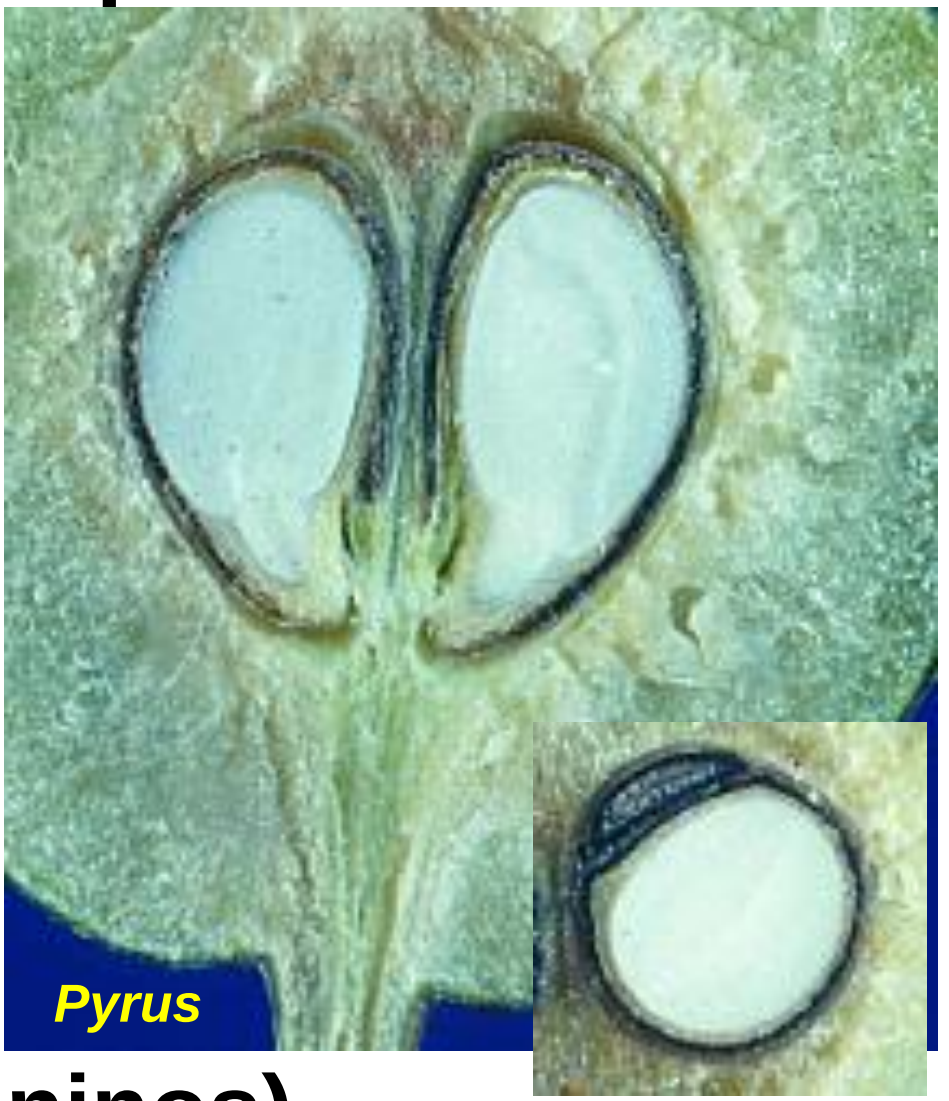
1. ESTÍPULAS

Haloragaceae



Sinapomorfias de Rosídeas

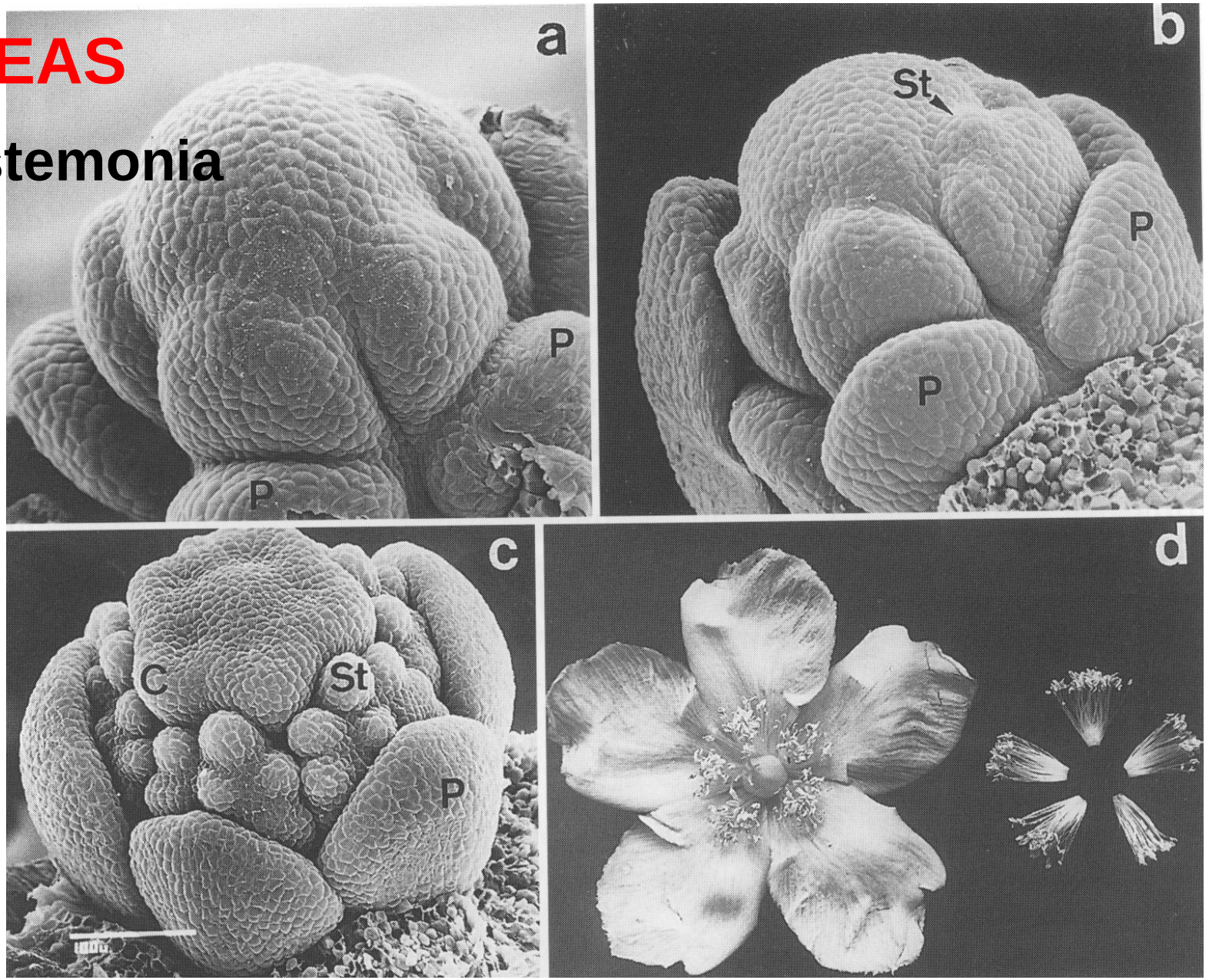
2. Redução do endosperma



3. Ácido elágico (taninos)

ROSÍDEAS

4. Diplostemonia

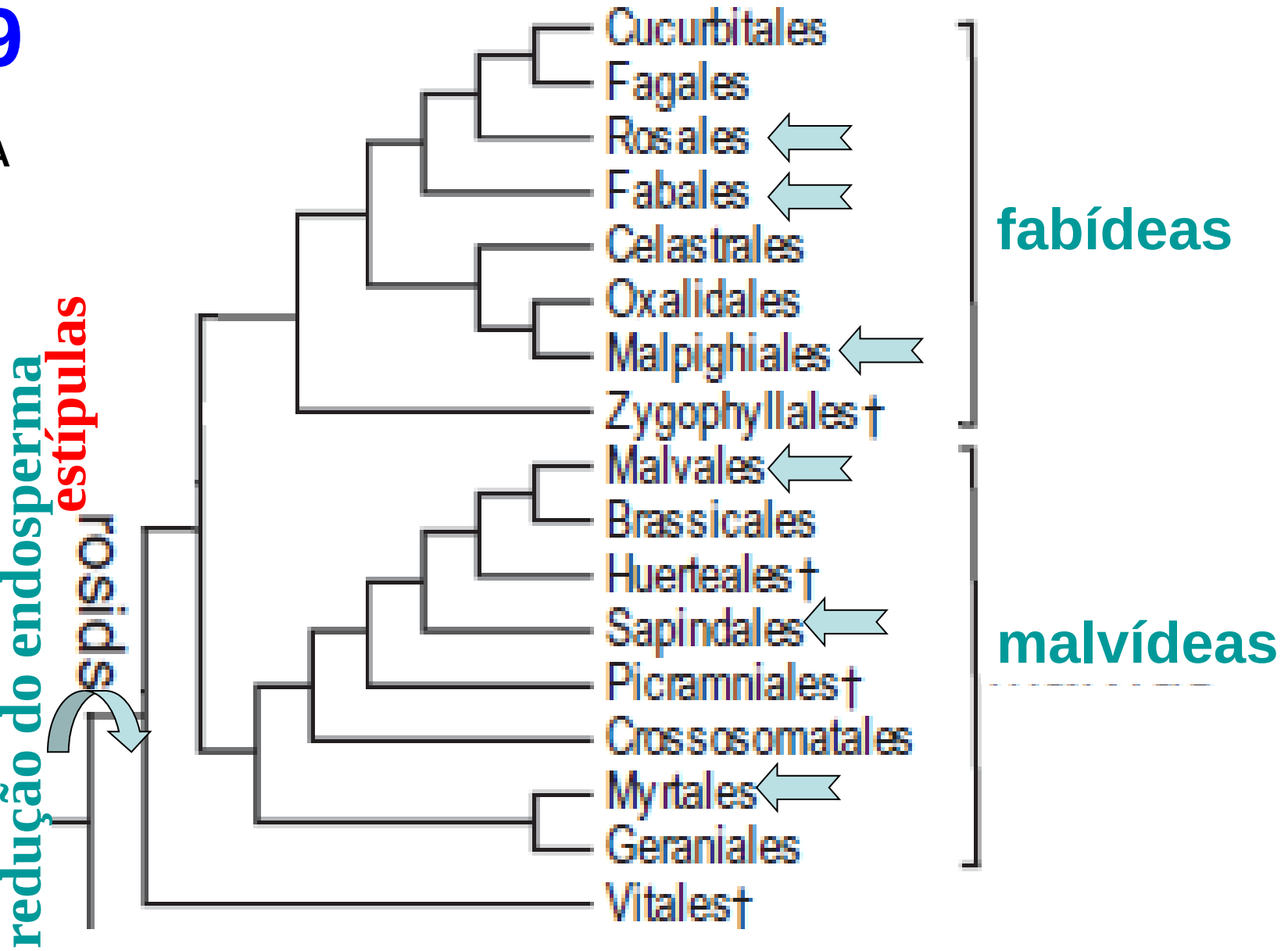


Hypericum hookerianum, Guttiferae Leins 2000

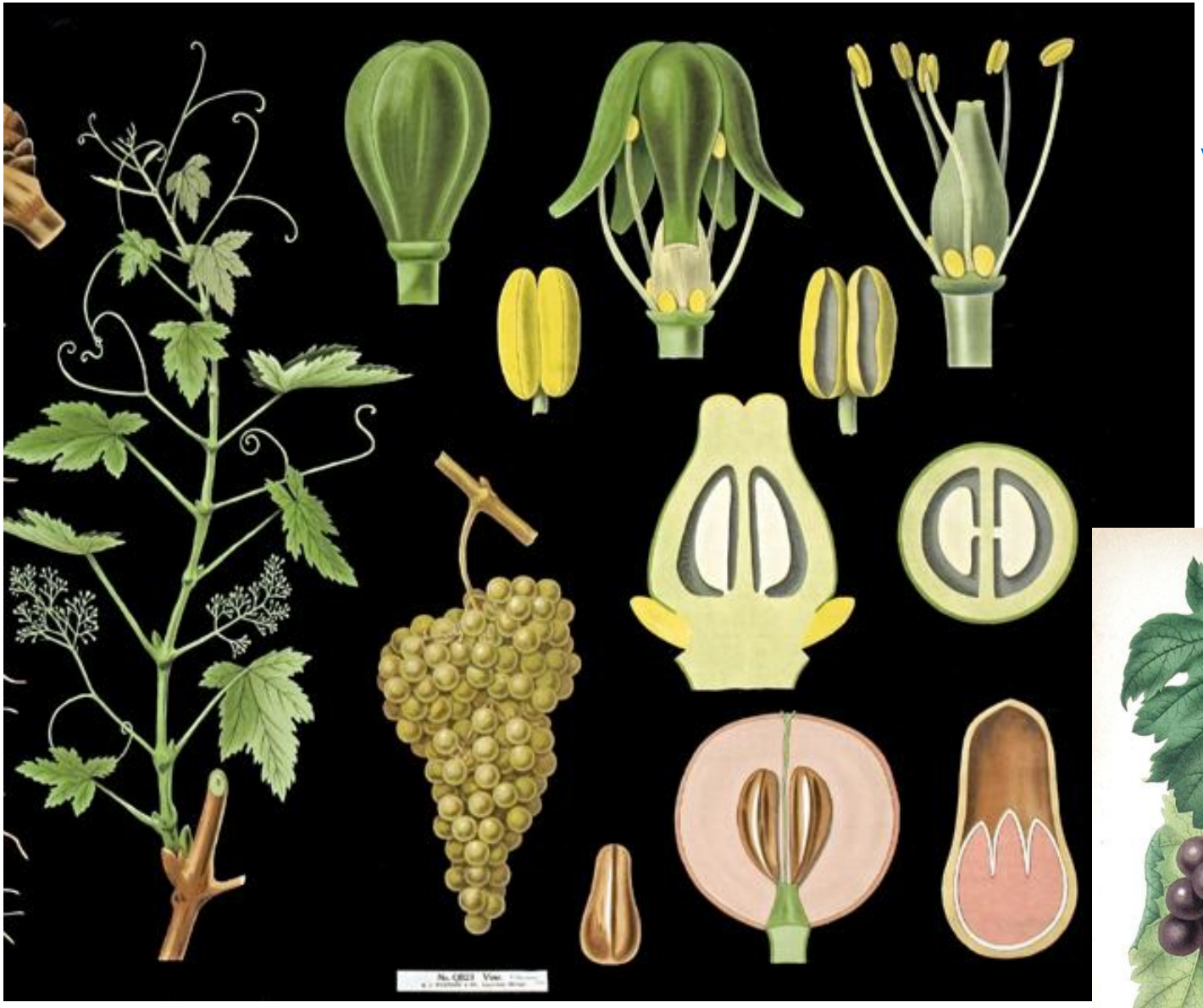
APG-III 2009

ROSÍDEAS

18S rDNA
***rbc*L**
atp*B*
***atp*1**
***mat*R**



VITALES
Vitaceae

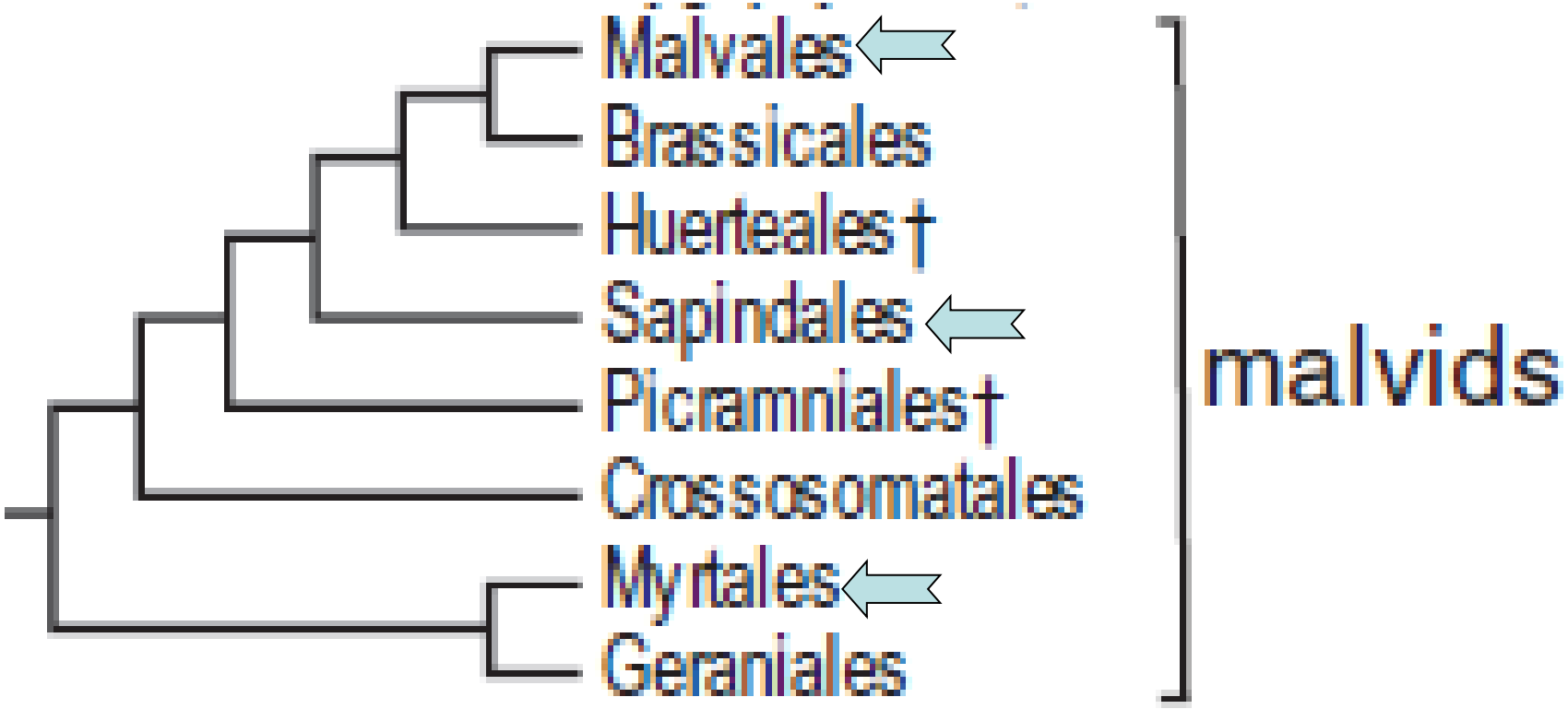


Vitis vinifera

ROSÍDEAS MALVÍDEAS

8 ordens/ c. 60 famílias

Sinapomorfias macromoleculares!



MYRTALES

ROSÍDEAS MALVÍDEAS

14 famílias/ 9.000 spp.

sinapomorfias:

1. Folhas opostas / 2. Redução das estípulas

3. Floema interno

4. Feixes vasculares bicolaterais

5. Pontoações guarnecidas

MYRTALES

sinapomorfias:

5. Hipanto

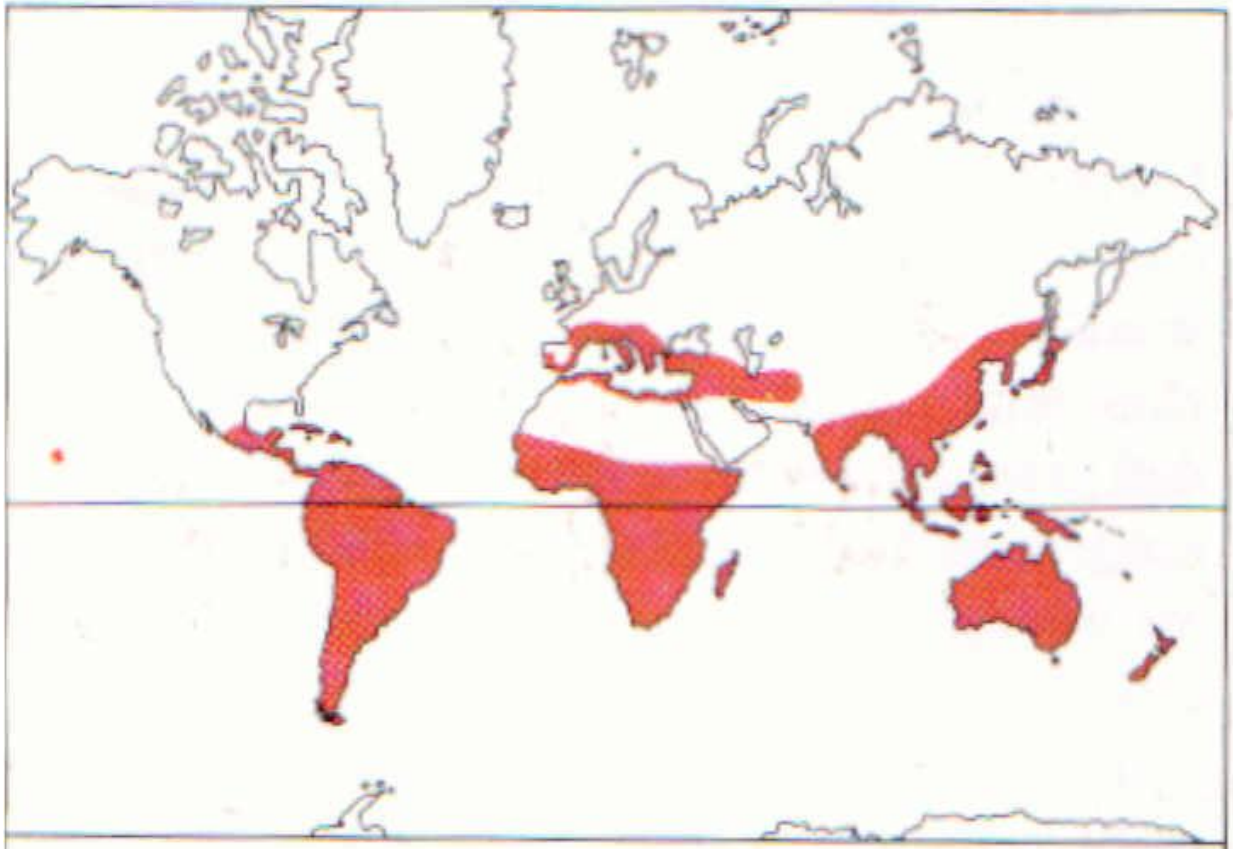
6. Pétalas de base estreita (até unguiculada)

7. Estames inflexos no botão

8. Estilete único (gineceu totalmente sincárpico)

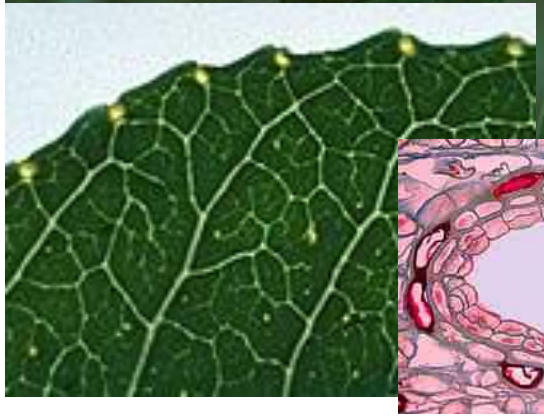
MYRTACEAE

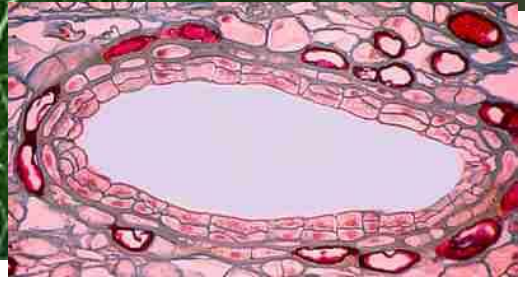
Feijoa



Number of genera: about 100
Number of species: about 3,000
Distribution: tropical and subtropical, chiefly America and Australia
Economic uses: timber, spices (cloves, allspice), essential oils, edible fruits and ornamentals

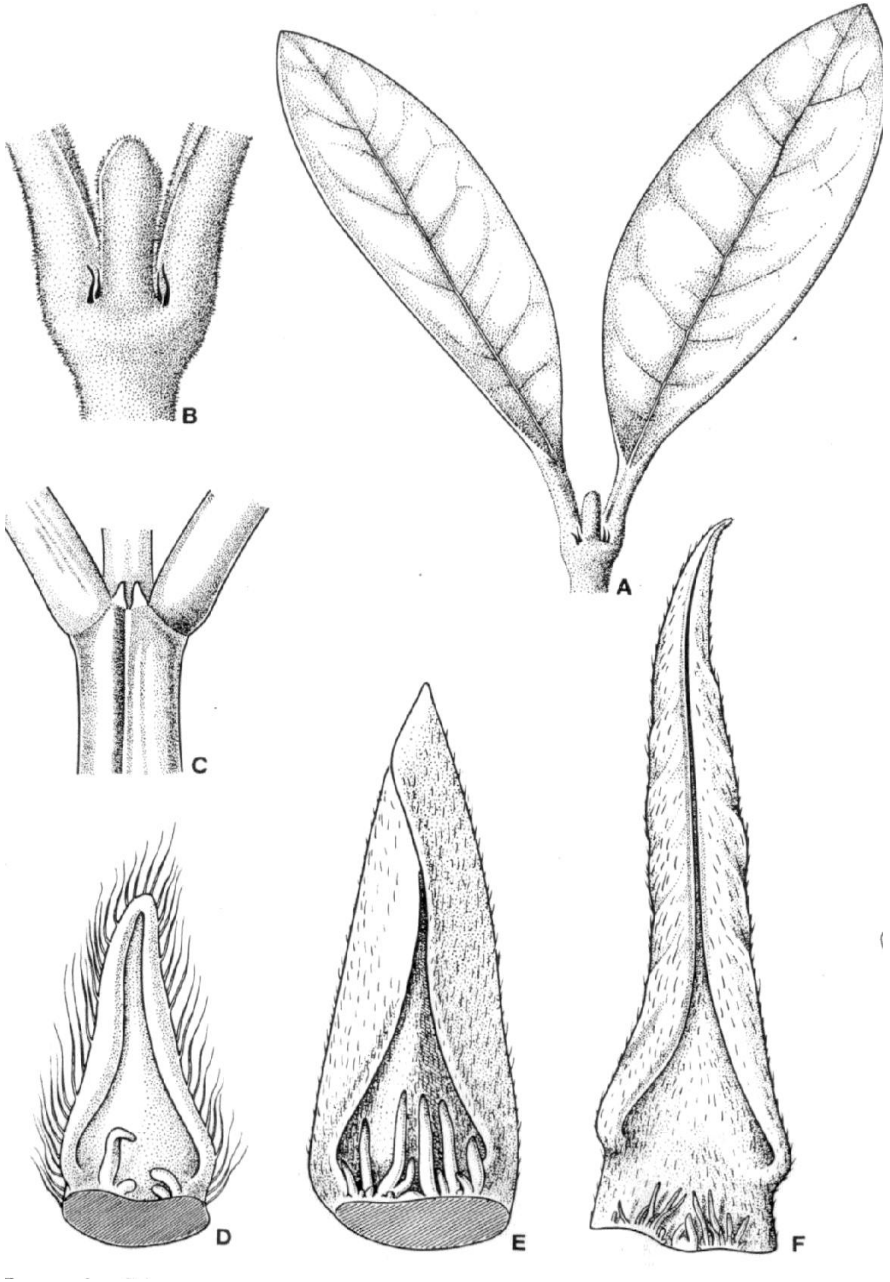
MYRTACEAE





MYRTACEAE

estípulas reduzidas



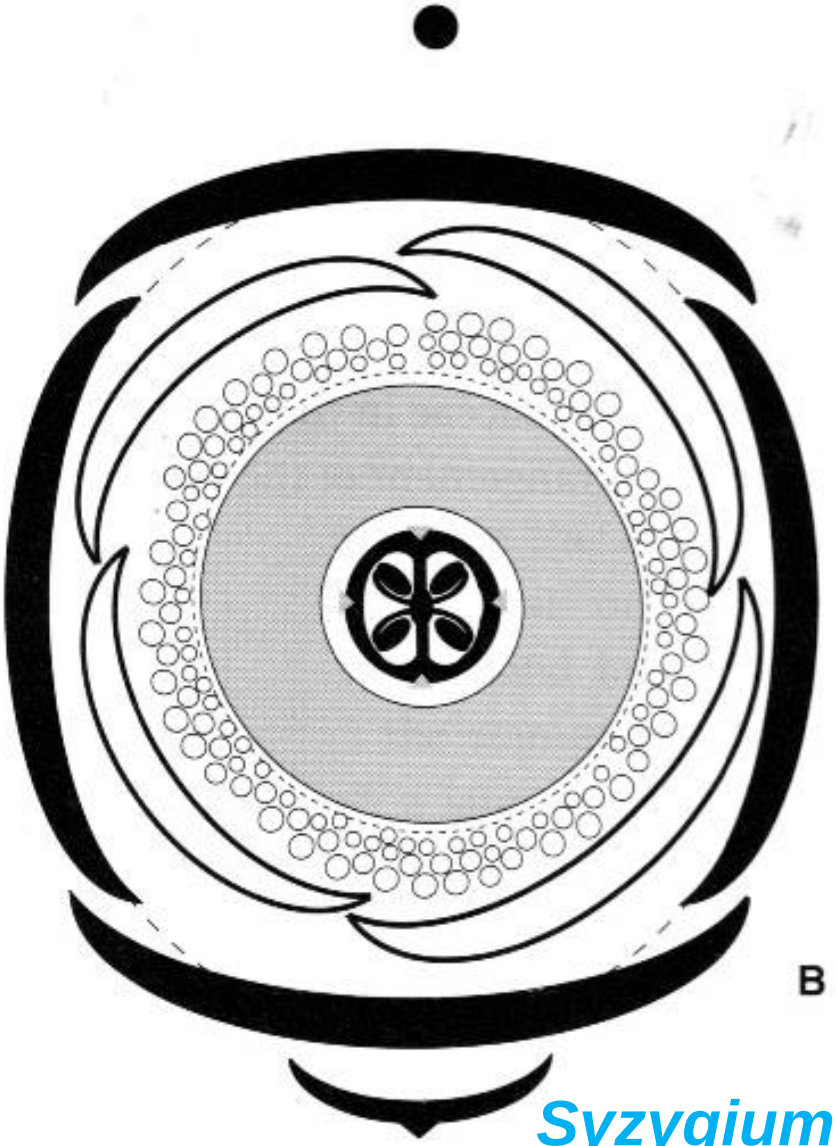
A, B – *Feijoa,* Myrtaceae

C – Crypteroniaceae

D-F – *Terminalia*, Combretaceae

Dahlgren & Thorne 1984

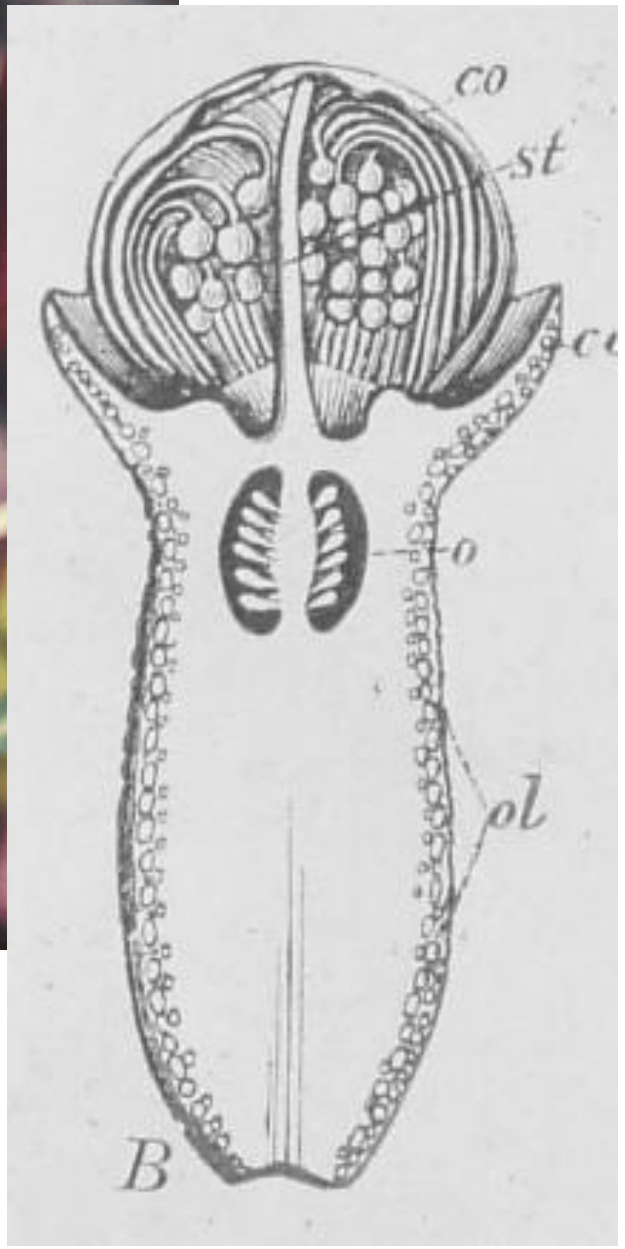
MYRTACEAE - MYRTALES



Syzygium

Ronse De Craene 2010

Eucalyptus



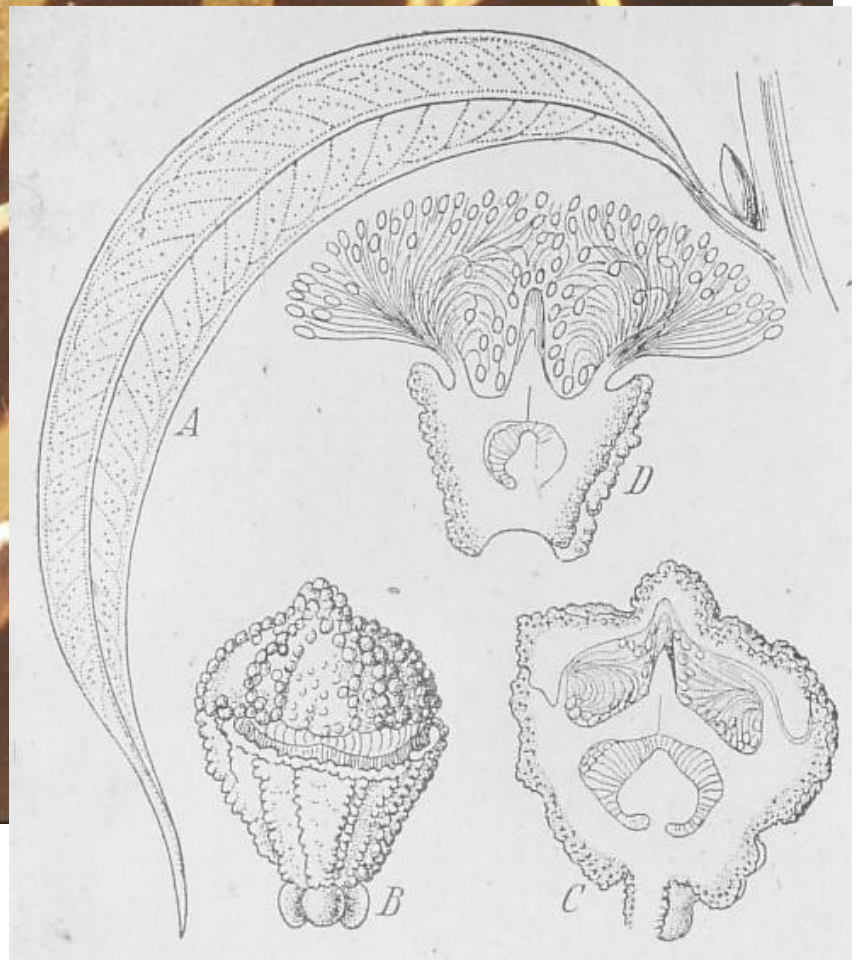
Syzygium
MYRTACEAE

Eugenia punicifolia

Syzygium

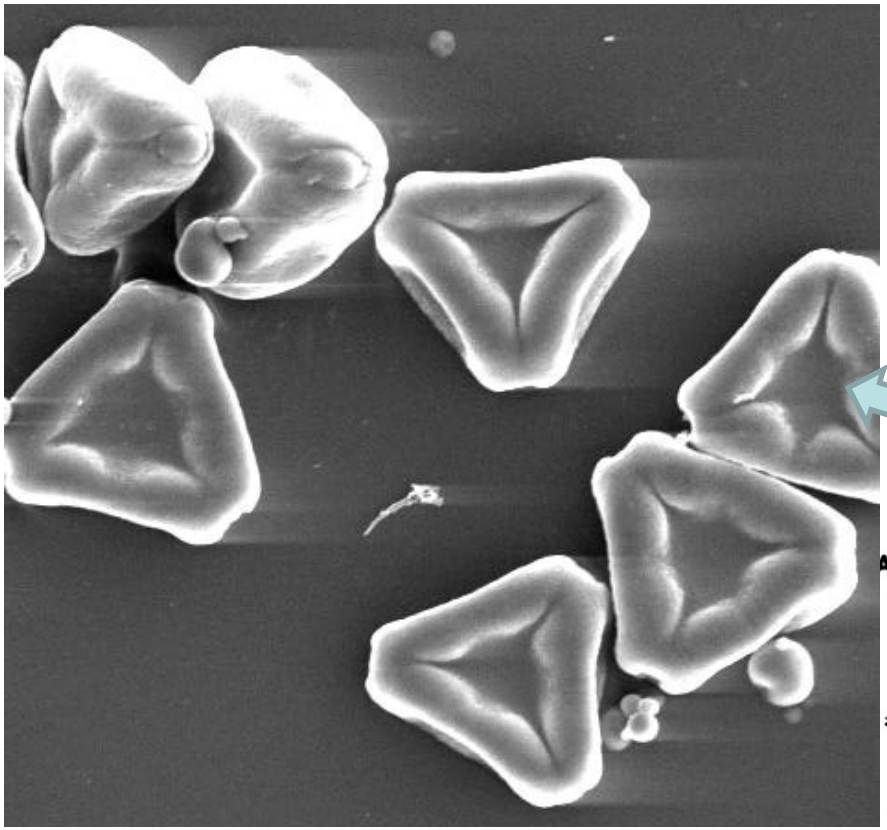
Myrciaria cauliflora

MYRTACEAE



Eucalyptus globulus

Myrtaceae PÓLEN



Eucalyptus

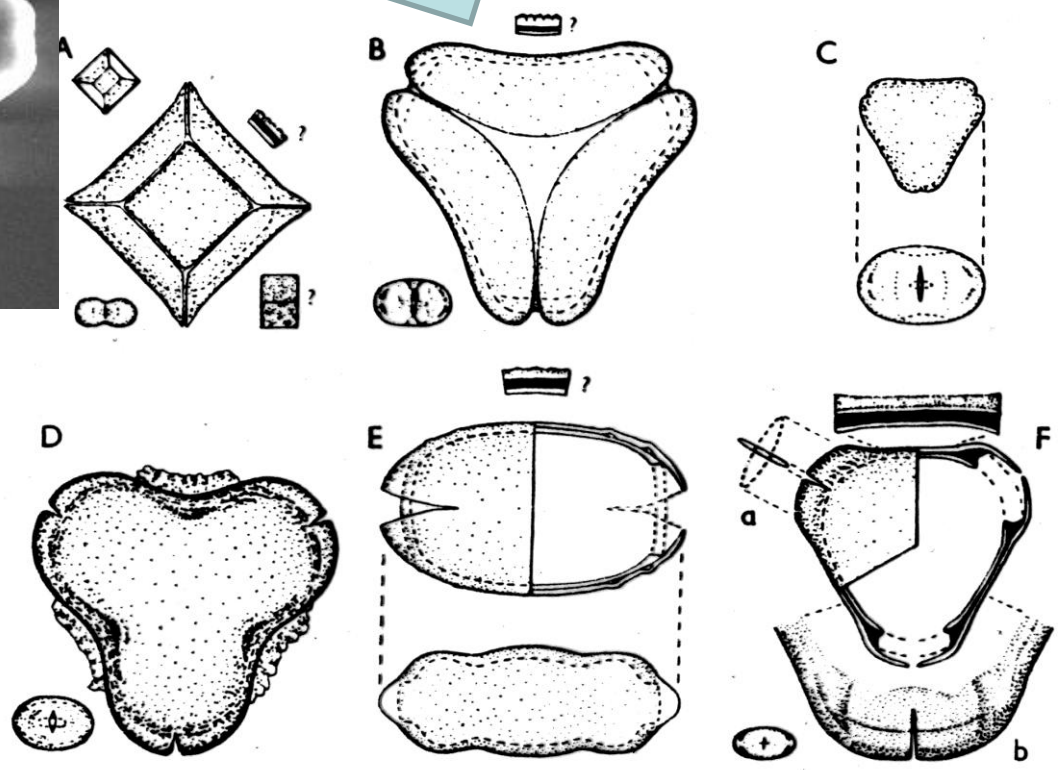
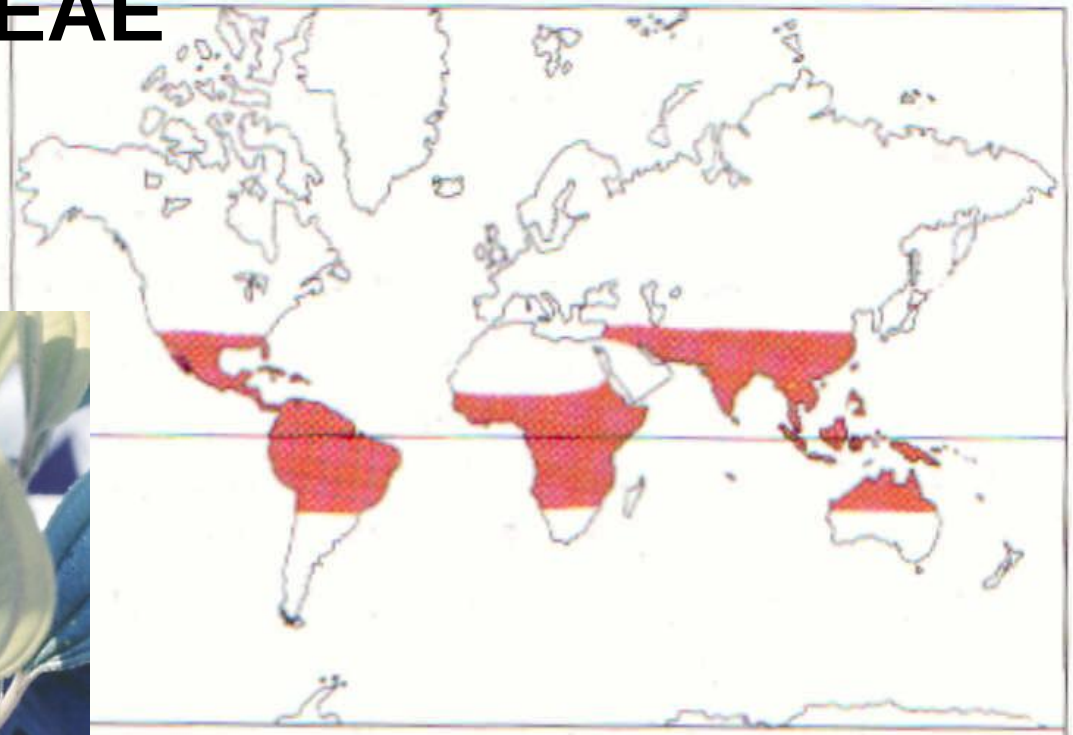


Fig. 164. MYRTACEAE. A, *Metrosideros linearis*. B, *Eucalyptus ficifolia*. C, *Baeckea virgata*. D, *Pileanthus peduncularis*(?). E, *Pileanthus peduncularis*. F, *Chamaelaucium uncinatum*.

Erdtman 1986

MELASTOMATACEAE



Number of genera: about 240
Number of species: about 3,000
Distribution: temperate but mainly tropical and subtropical, with center in S America.
Economic uses: local use of the hardwood and edible fruits of some species and some ornamentals.

MYRTALES

MELASTOMATACEAE

Tibouchina

MYRTALES

MELASTOMATACEAE

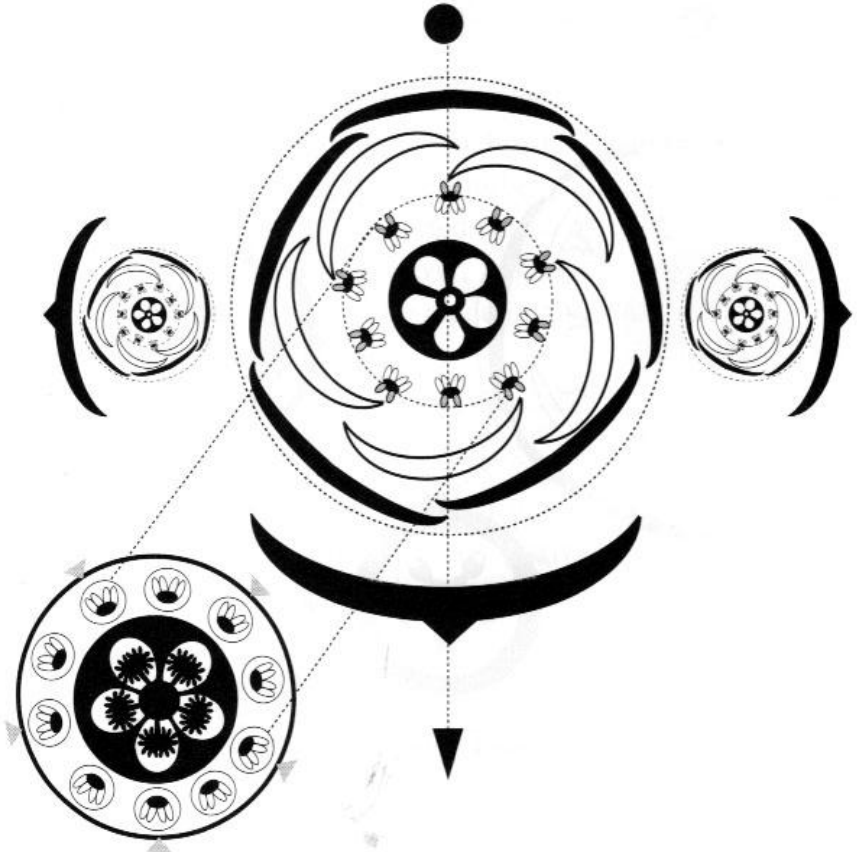
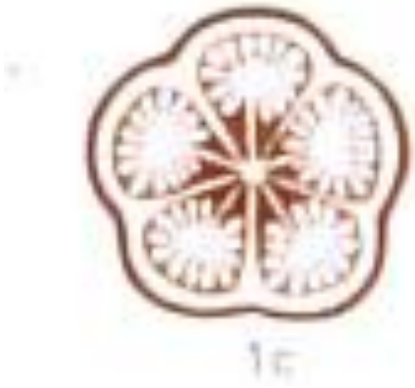


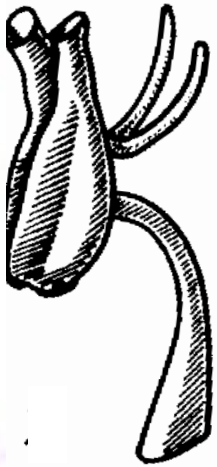
Fig. 10.14. *Medinilla magnifica* (Melastomataceae): partial inflorescence. Note the depressions around the ovary with fitting anthers.

Medinilla

Ronse De Craene 2010

MELASTOMATACEAE





Lavoisiera
Melastomataceae

Lavoisiera

MELASTOMATACEAE

Microlicia multicaulis

Tibouchina
MELASTOMATACEAE

Pereira et al. 2011

Fig. 1. Flowers from first and second day of anthesis in *T. sellowiana* (a) and in *T. pulchra* (b) and from the first and third day of anthesis in *T. pulchra* (c).

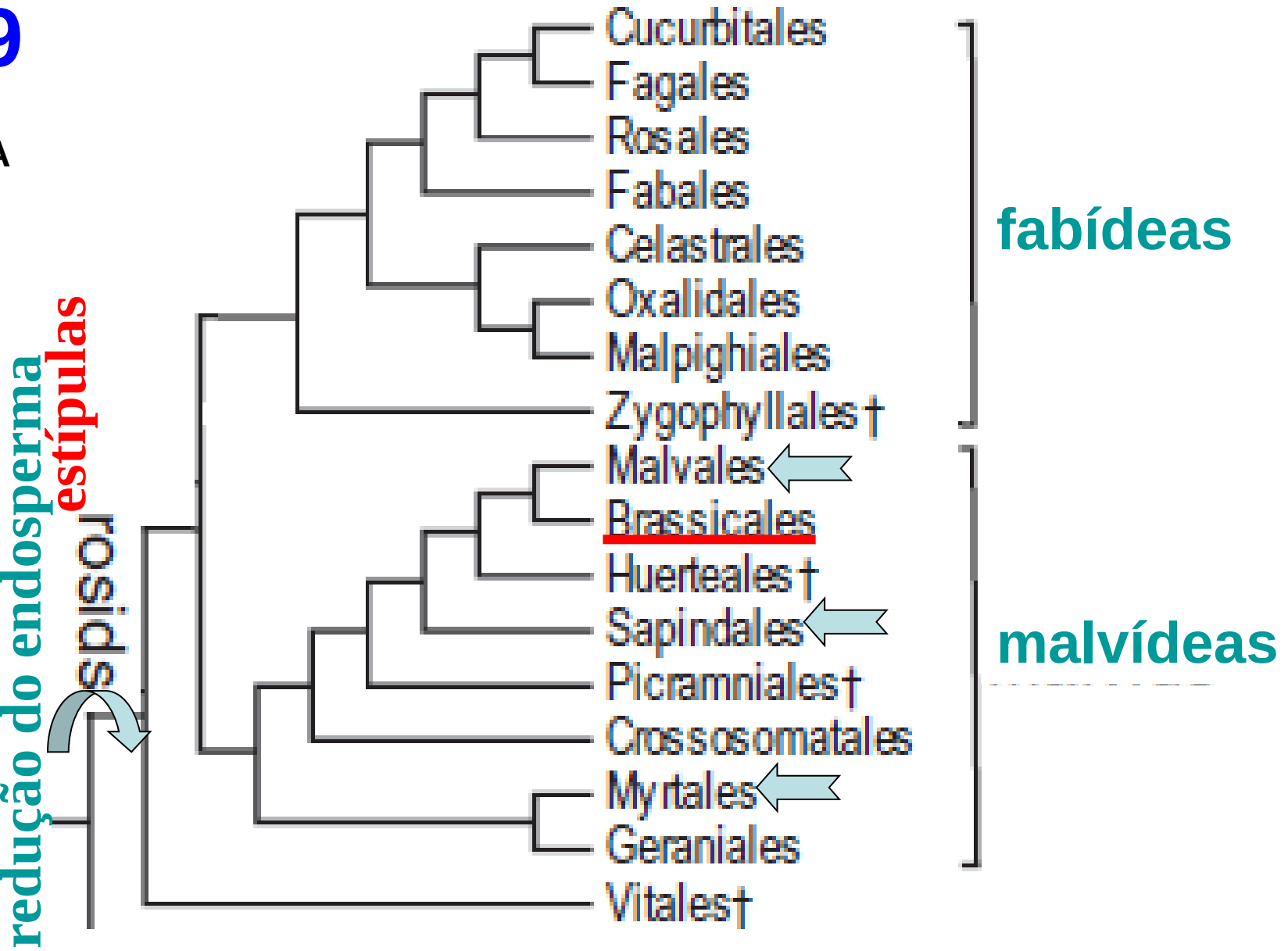
Qualea grandiflora

VOCHYSIACEAE - MYRTALES

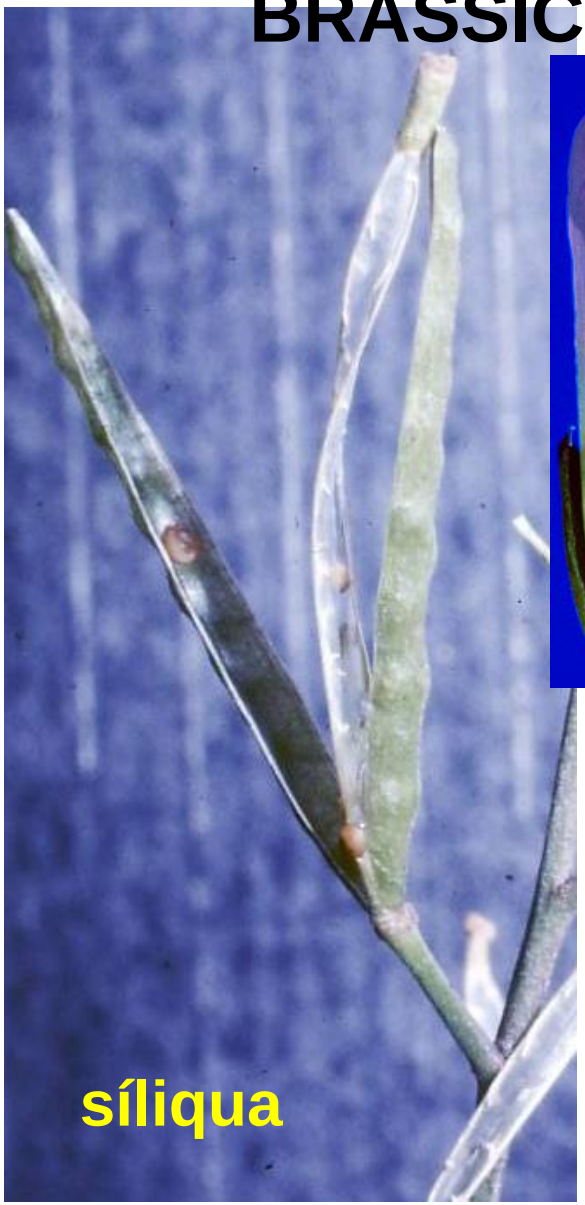
APG-III 2009

ROSÍDEAS

18S rDNA
***rbc*L**
atp*B*
***atp*1**
***mat*R**



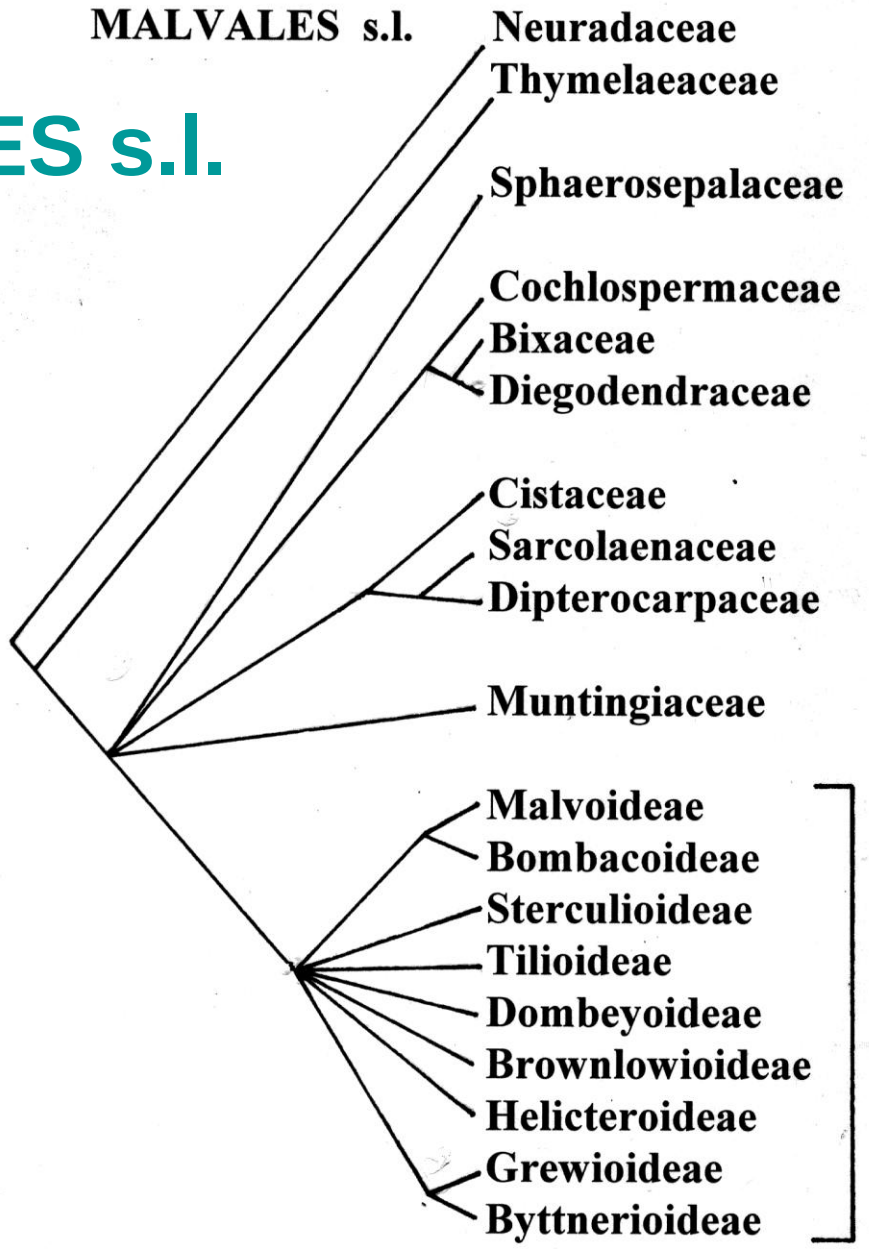
BRASSICALES
BRASSICACEAE


síliqua


Brassica oleracea

ROSÍDEAS MALVÍDEAS

MALVALES s.l.



10-11 famílias
5.000 spp.

MALVACEAE s.l.
(4.500 spp.)

MALVALES s.l.

sinapomorfias:

***rbc*L + *atp*B**

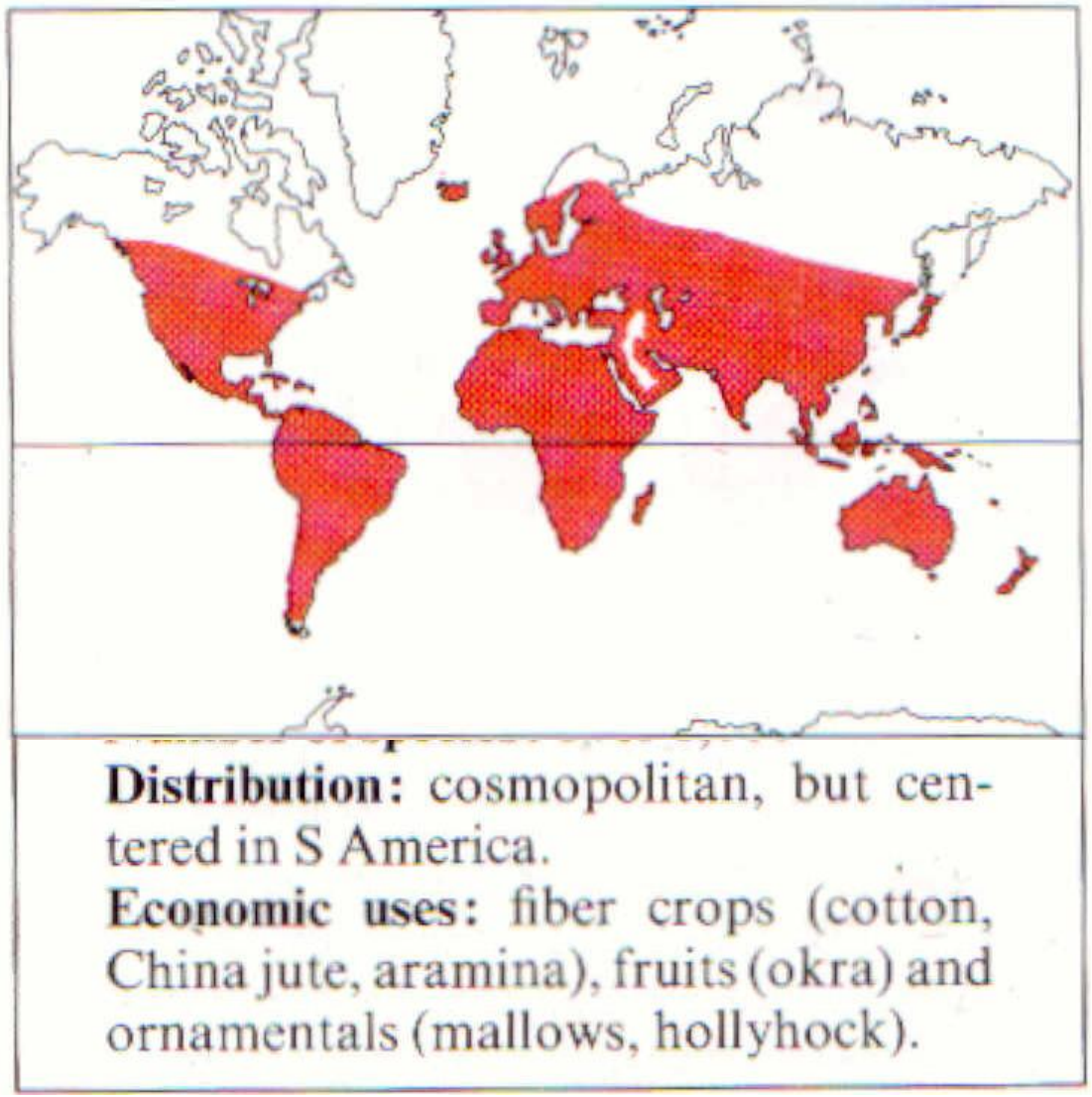
cálice gamossépalo
tricomas estrelados
mucilagem
polistemonia (maturação centrífuga)

MALVACEAE

250 gêneros
4200 spp.

Sinapomorfias:

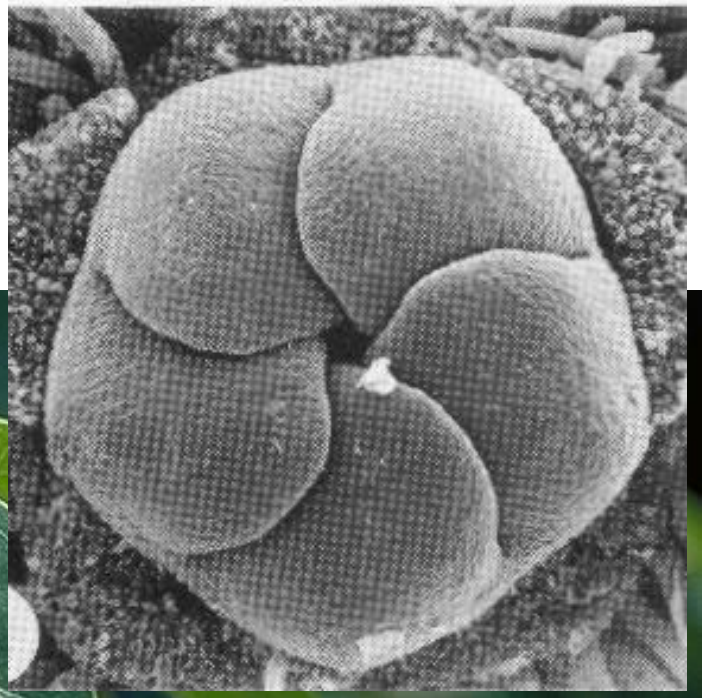
folhas actinódromas
cálice valvar
corola contorta
nectários nas sépalas



Distribution: cosmopolitan, but centered in S America.
Economic uses: fiber crops (cotton, China jute, aramina), fruits (okra) and ornamentals (mallows, hollyhock).

Heywood 1974

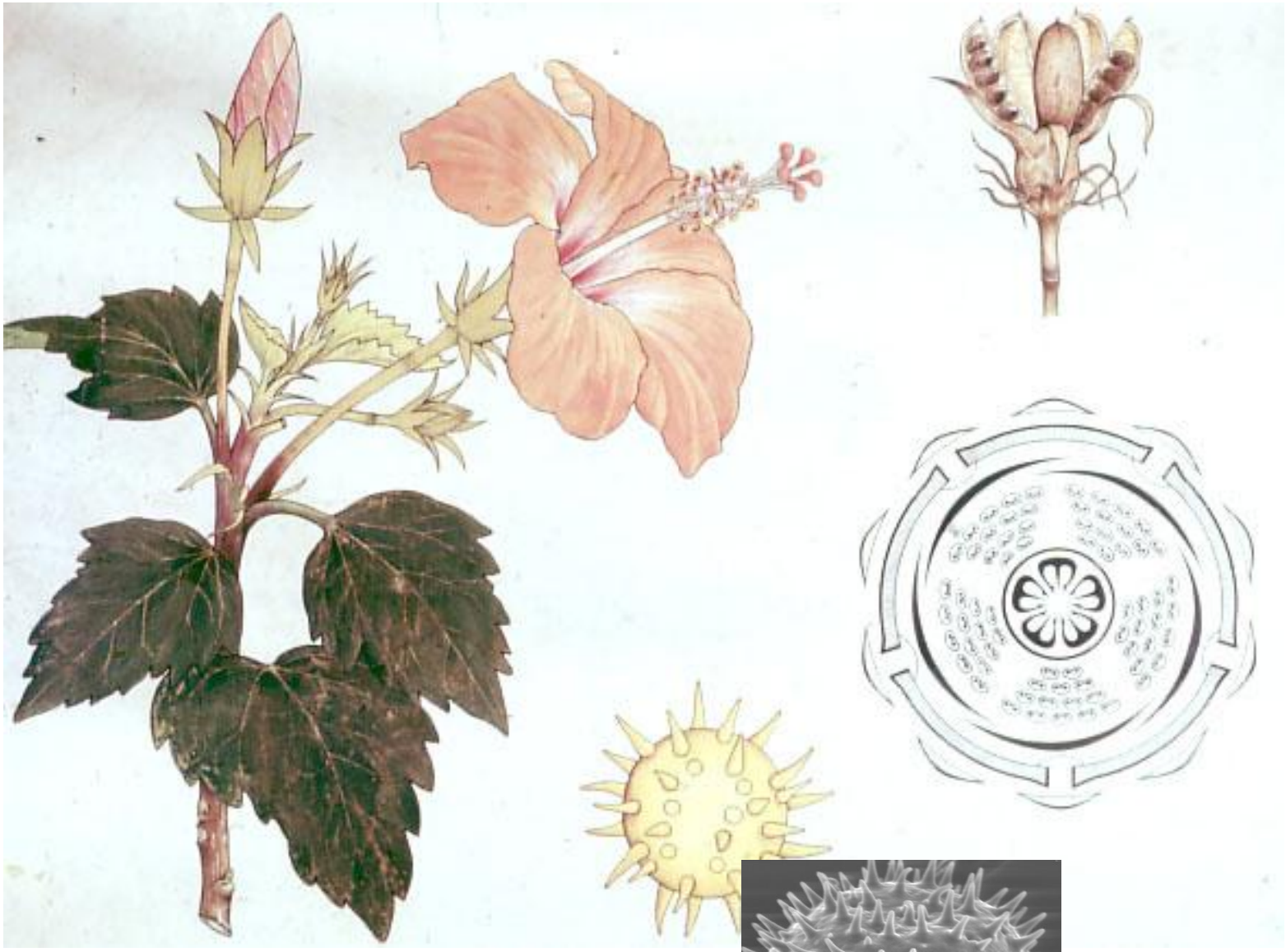
Eremalche

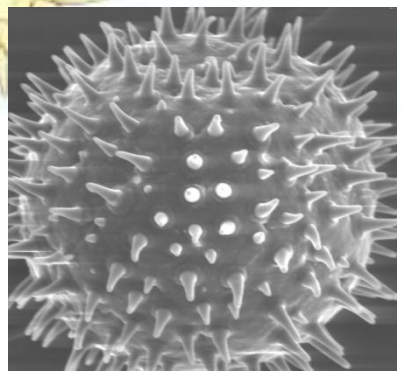


Prefloração imbricativa contorta

Hibiscus

MALVACEAE

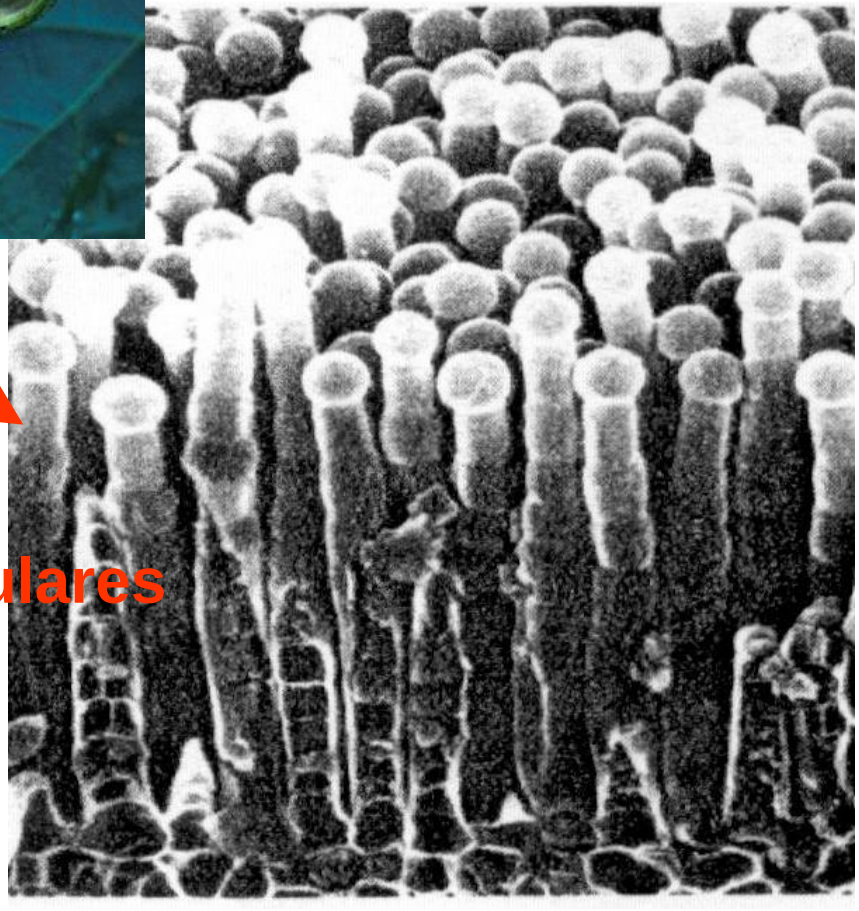




Hibiscus

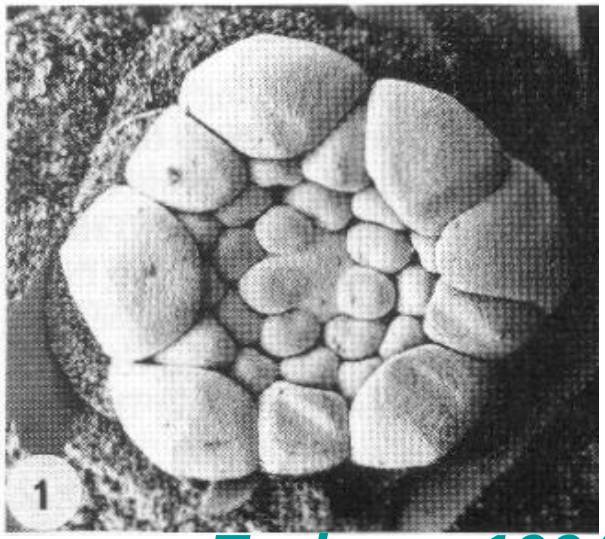
MALVACEAE

MALVACEAE



nectário na base das sépalas
tricomas glandulares multicelulares

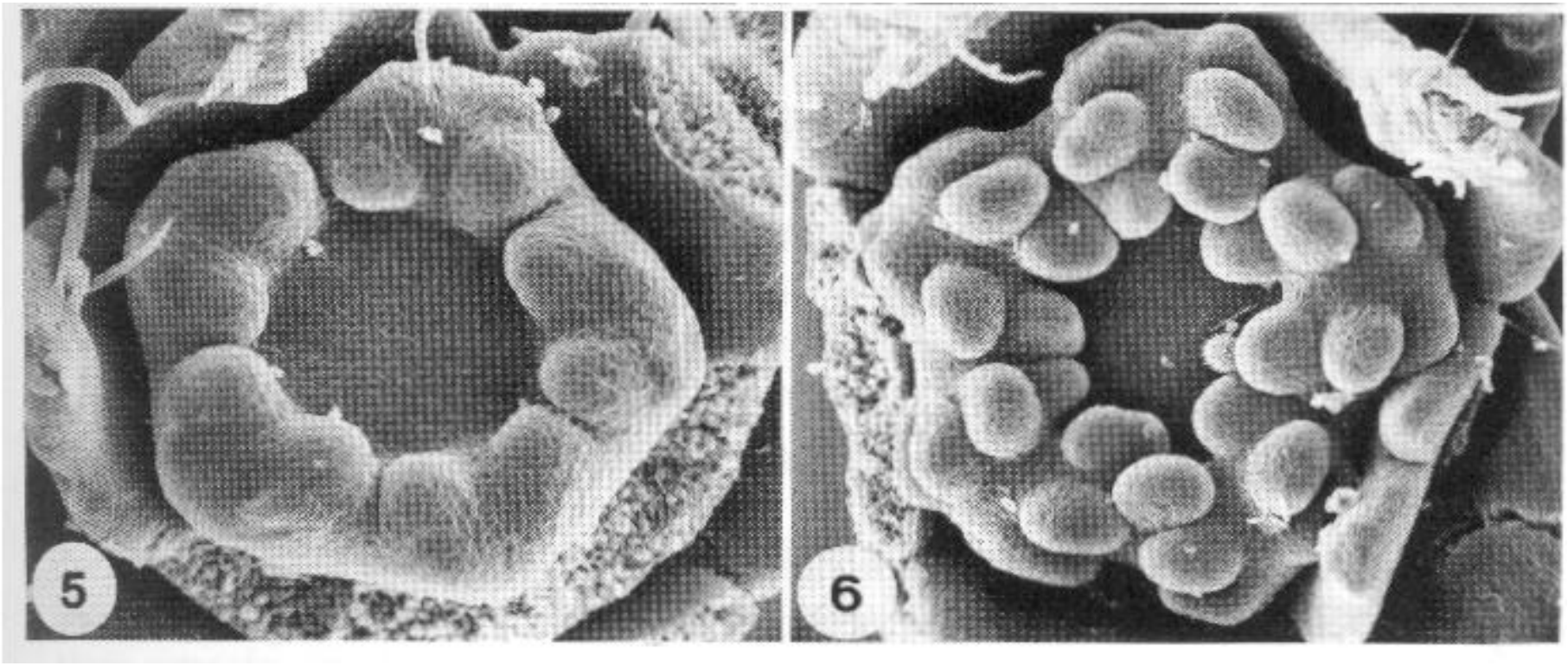
Maturação do androceu
na maioria das plantas é centrípeta



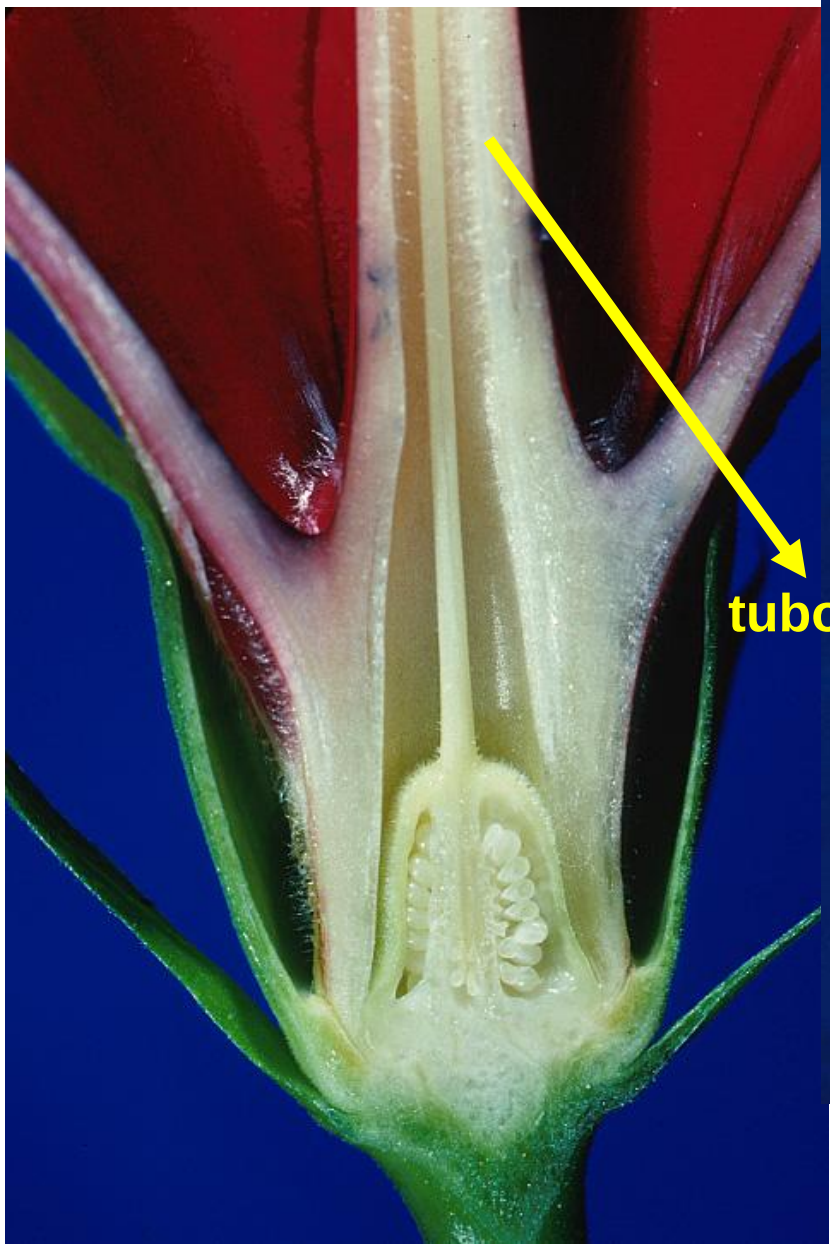
CENTRÍFUGA

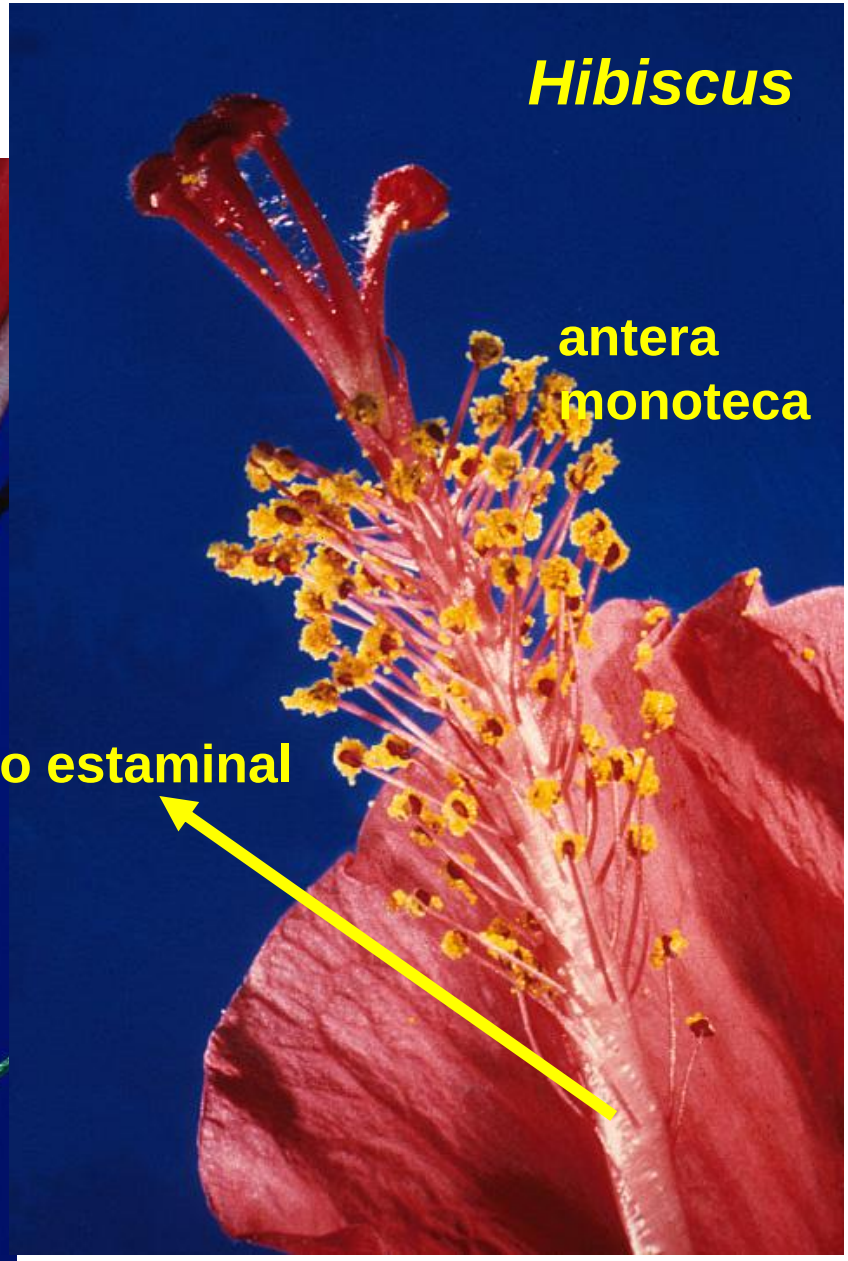
Kitaibelia **MALVACEAE**

Endress 1994



MALVACEAE





epicálice

Hibiscus coccineus

MALVACEAE

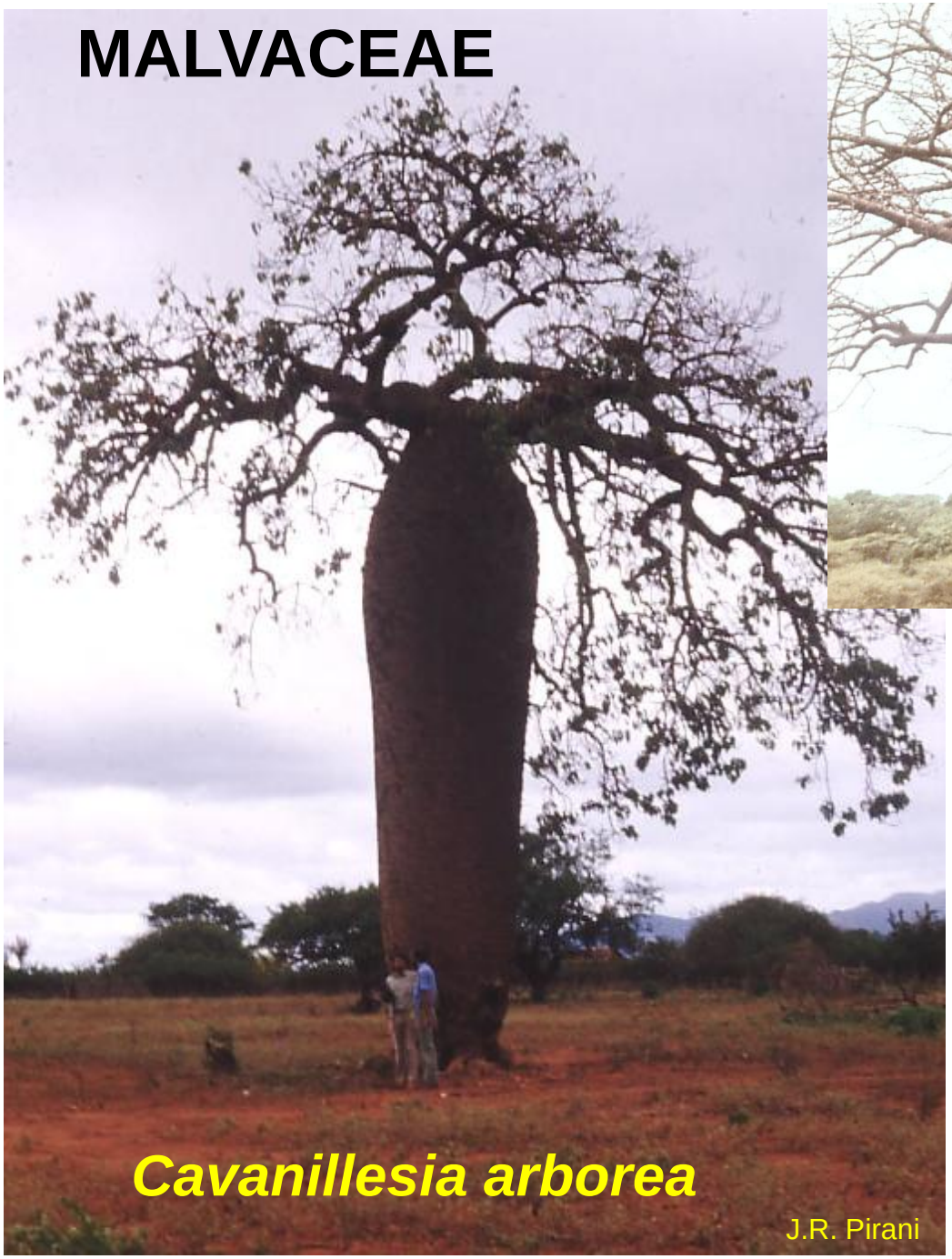
Gossypium

MALVACEAE


Adansonia
Malvaceae

MALVACEAE

Adansonia digitata



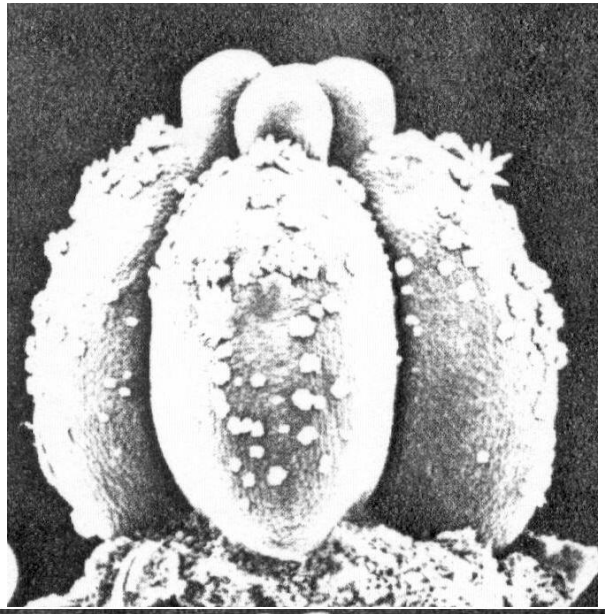
Theobroma cacao

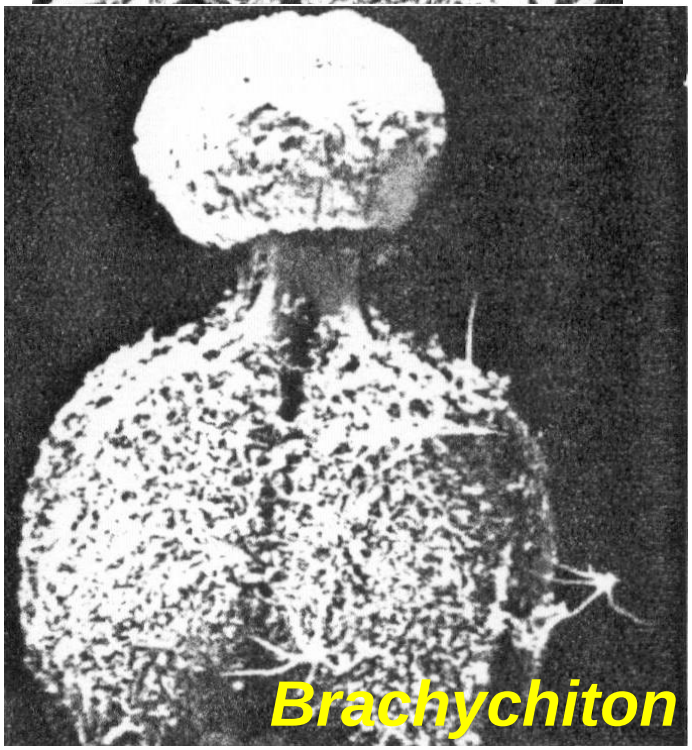
MALVACEAE

Theobroma cacao

MALVACEAE

MALVACEAE



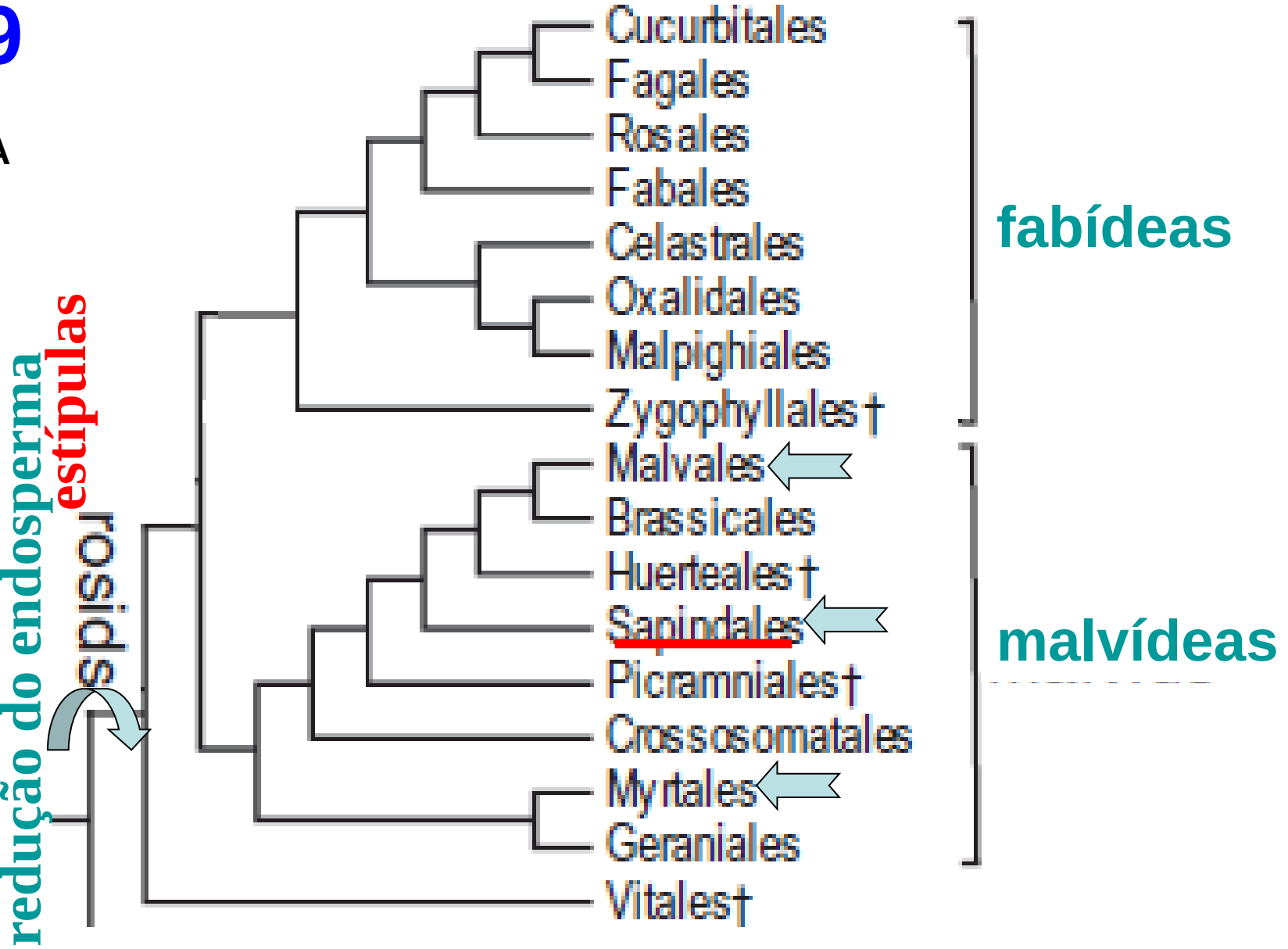


Sterculia chicha

APG-III 2009

ROSÍDEAS

18S rDNA
***rbc*L**
atp*B*
***atp*1**
***mat*R**



ROSÍDEAS MALVÍDEAS

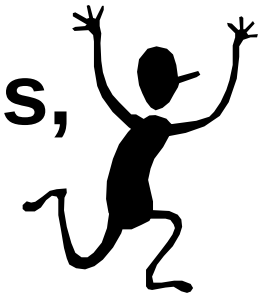
Ordem SAPINDALES
9 famílias, 5.800 spp.

sinapomorfias:

***rbc*L + *atp*B + 18SrDNA**

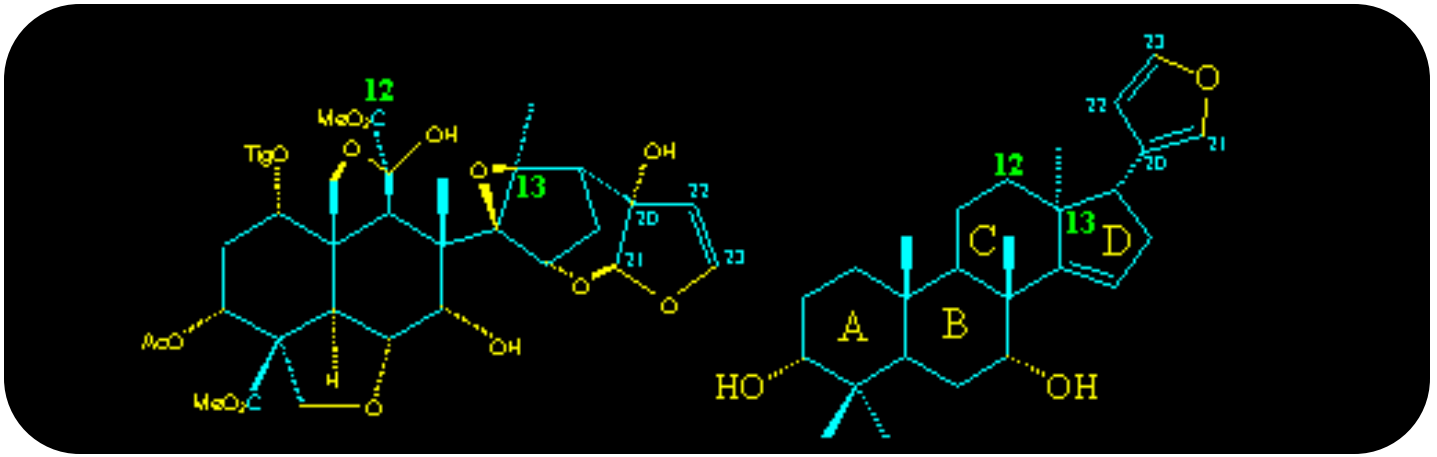
folhas compostas (pinadas)
disco nectarífero
química diversificada

Rutaceae: óleos contendo Terpenos, Terpenóides e Limonóides



- **Hidrocarbonetos com duplas ligações**
  - **Monoterpenos C10H16**
  - **Triterpenos C30H48**

- **Terpenóides são análogos contendo Oxigênio**
- **Limonóides são derivados de Triterpenos**



SAPINDACEAE

SAPINDALES

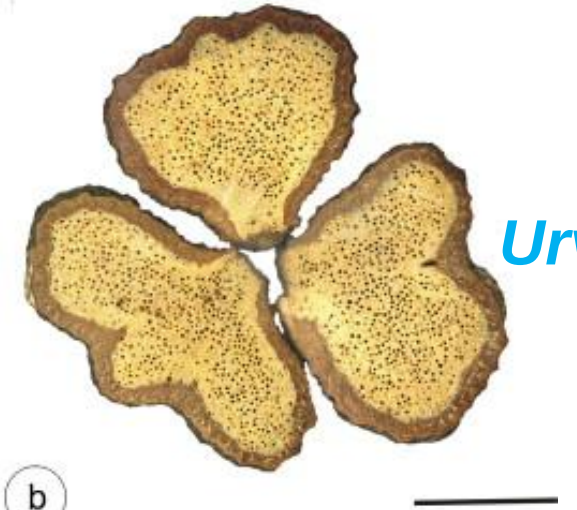
SAPINDACEAE - variações cambiais em lianas.

Tamaio et al. 2011

Thinouia

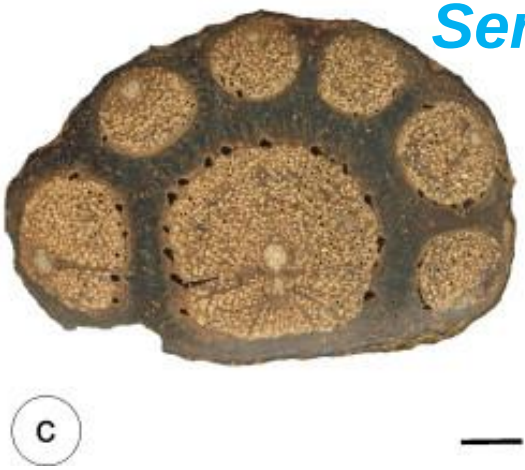
corded vascular cylinder (*T. restingae*)

Urvillea



fissured vascular cylinder (*U. rufescens*)

Serjania



compound vascular cylinder (*S. fuscifolia*)

divided vascular cylinder (*S. corrugata*)

Scale bars = 1 cm (a–c), 0.5 cm (d)

SAPINDACEAE
SAPINDALES

Serjania

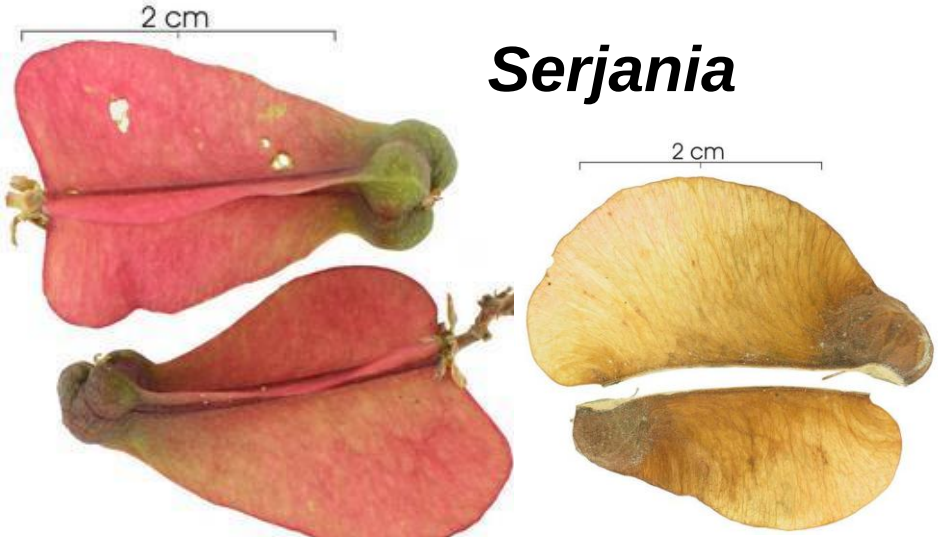
C. partial inflorescence with staminate flowers, D. reproductive organs of pistillate flower.

Ronse de Craene 2010

SAPINDACEAE

Sapindus saponaria

Serjania

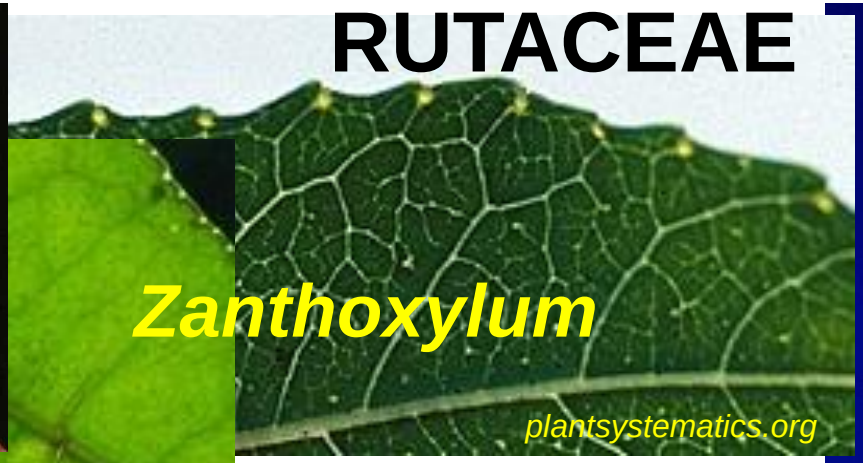


SAPINDALES

Lichi sinensis

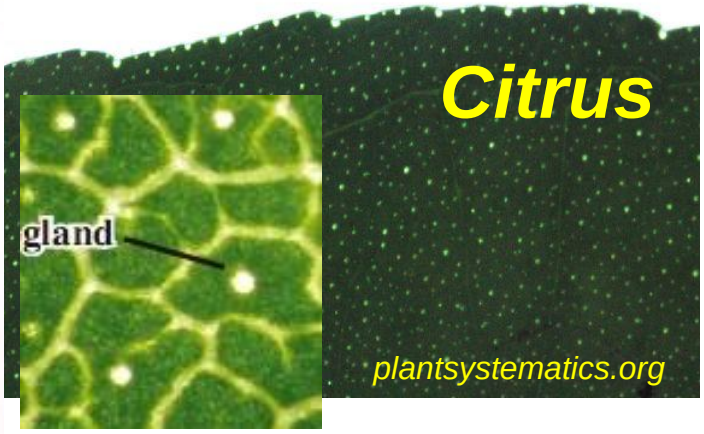
RUTACEAE

Zanthoxylum



Murraya

Heywood 1978



Citrus

SAPINDALES

RUTACEAE

SAPINDALES

Citrus

fruto: baga

Robbins & Weier 1950

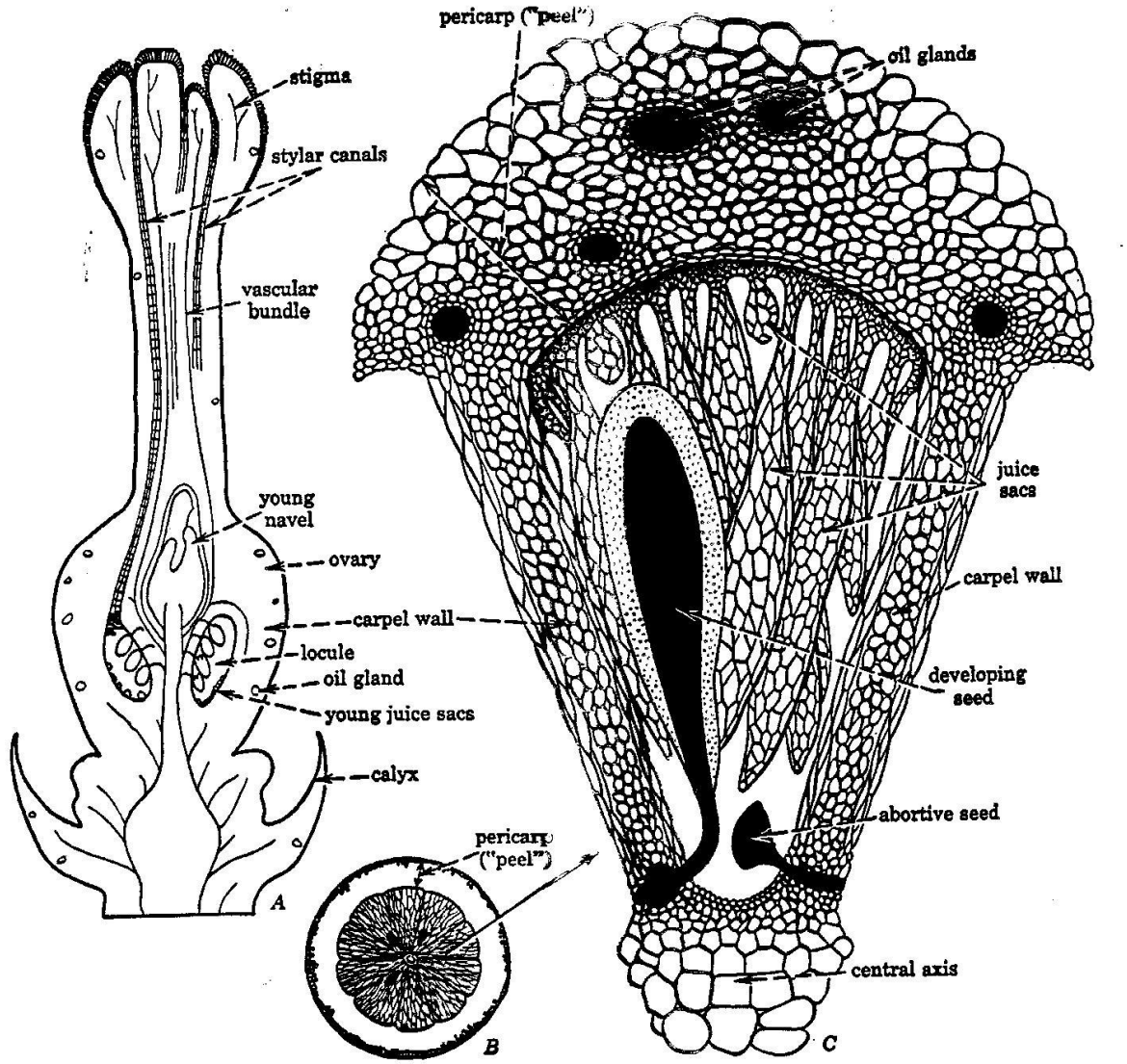
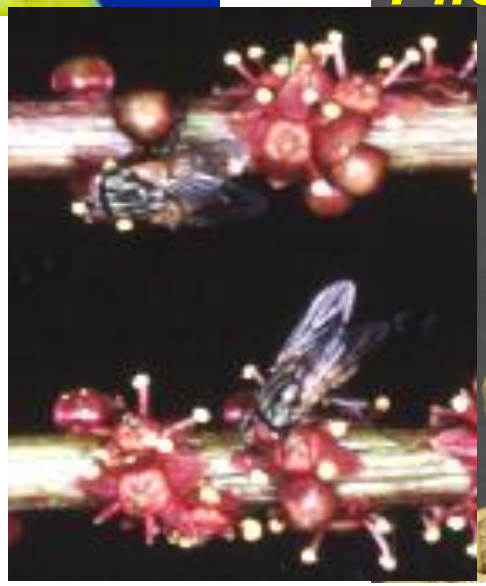


FIG. 10.15. Flower and fruit (hesperidium) of orange. *A*, diagrammatic lengthwise section of flower; *B*, cross section of fruit; *C*, structural detail of one carpel. (Redrawn from Bartholomew and Reed in Webber and Batchelor's *The Citrus Industry*, Univ. of Calif. Press.)

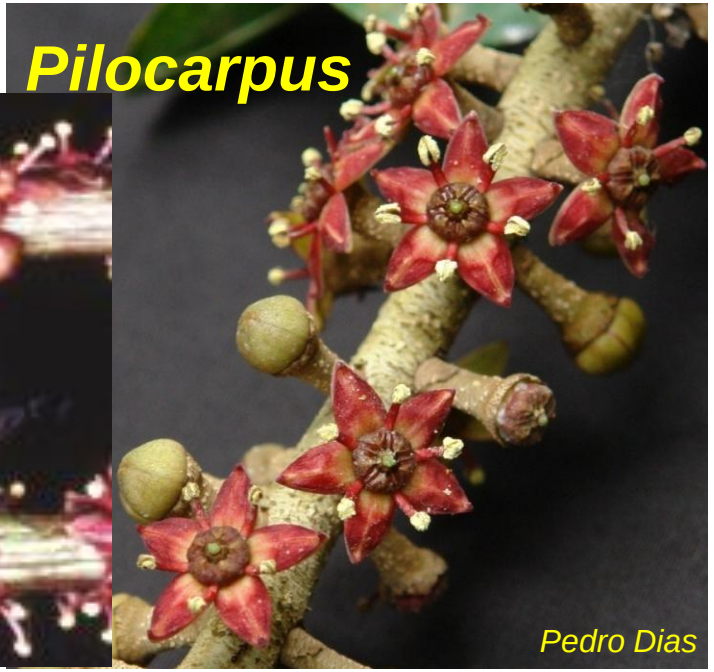
ROBBINS & WEIER 1950

Ruta graveolens

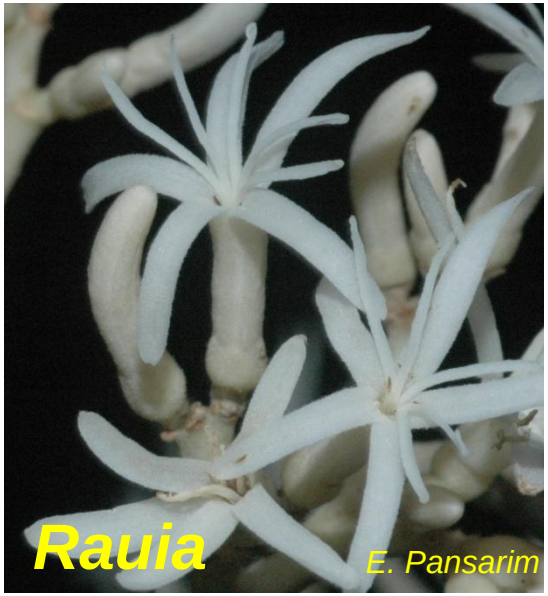
nectário



Pilocarpus



RUTACEAE – simpetalia?

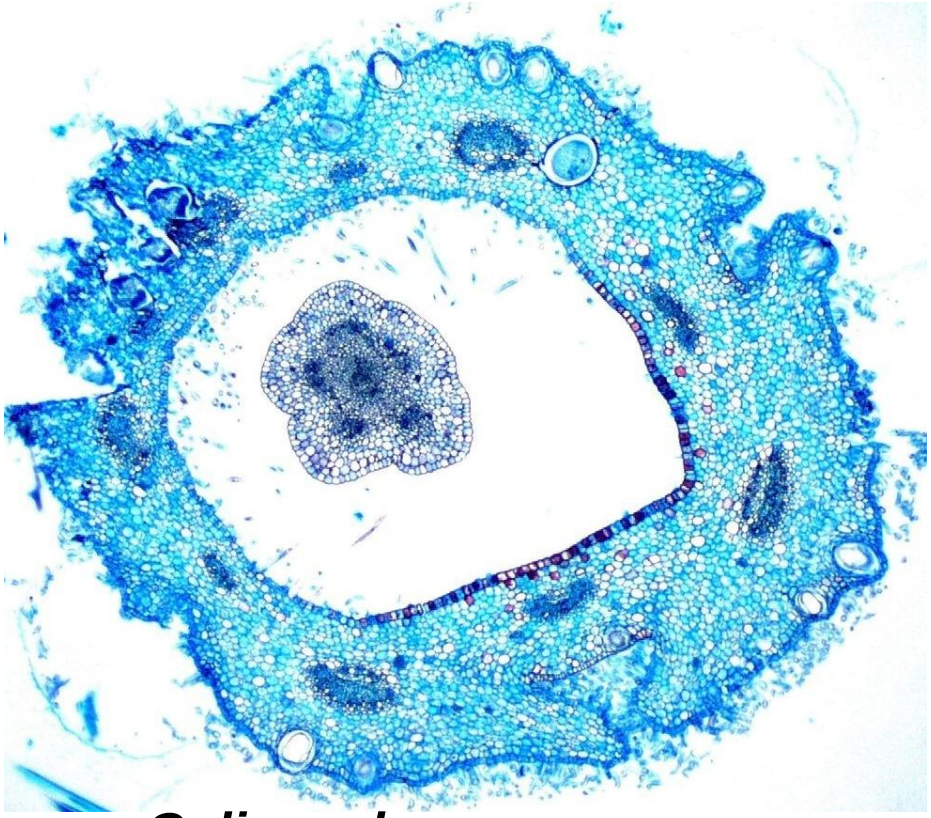


Subtribo Galipeinae (tribo Galipeeae, Rutoideae) – as flores tubulosas oferecem néctar como recurso e são polinizadas por animais com probóscide ou bico longos.

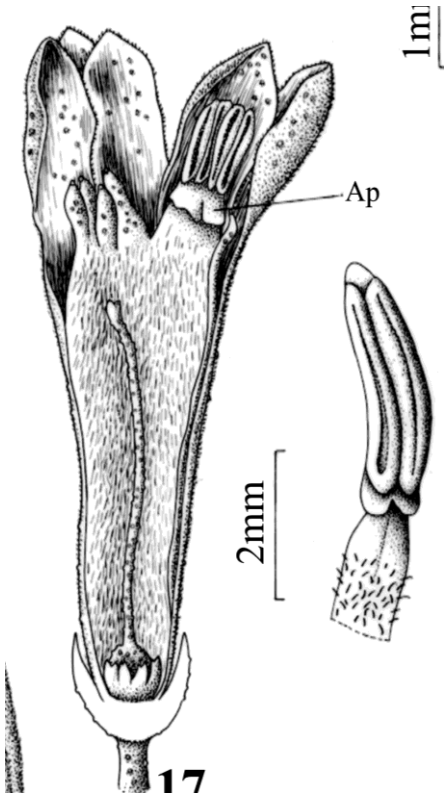
Borboleta da família Pieridae

Beija-flor: ***Polytmus guainumbi***

RUTACEAE - a corola tubulosa não é genuinamente simpétala; as *pétalas são fundidas aos 5 filetes* alternados a elas ou = pseudossimpetalia



Galipea dasysperma

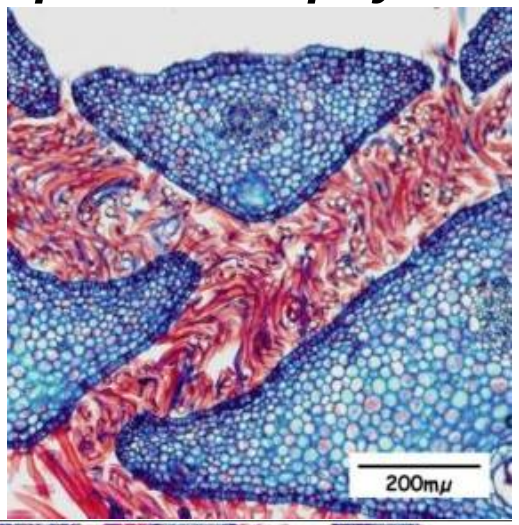


Galipea ramiflora

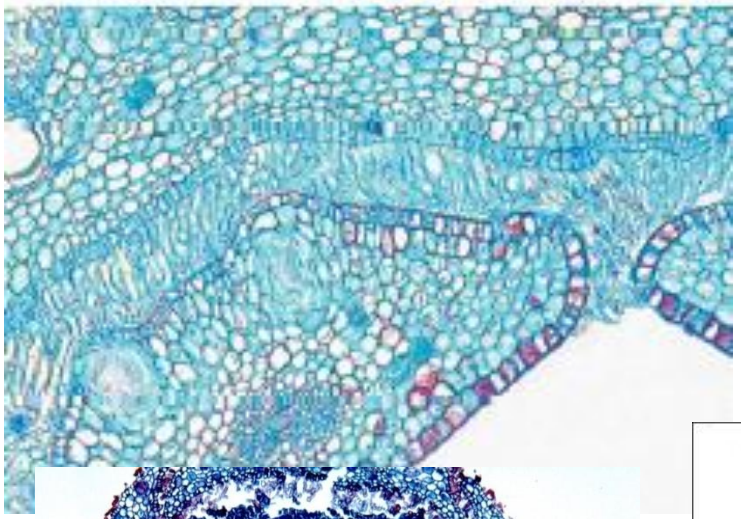
Pirani *et al.* 2010

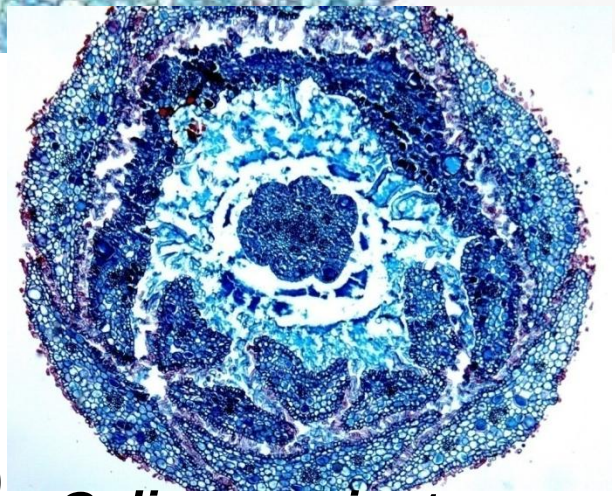
- **as pétalas são inteira ou distalmente coerentes entre si, e aderentes aos filetes por meio de *tricomas* - pseudossimpetalia**

Conchocarpus heterophyllus



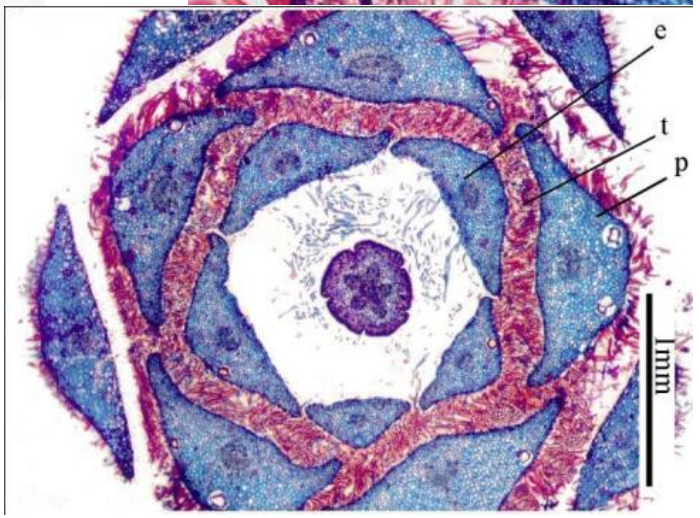
Galipea jasminiflora





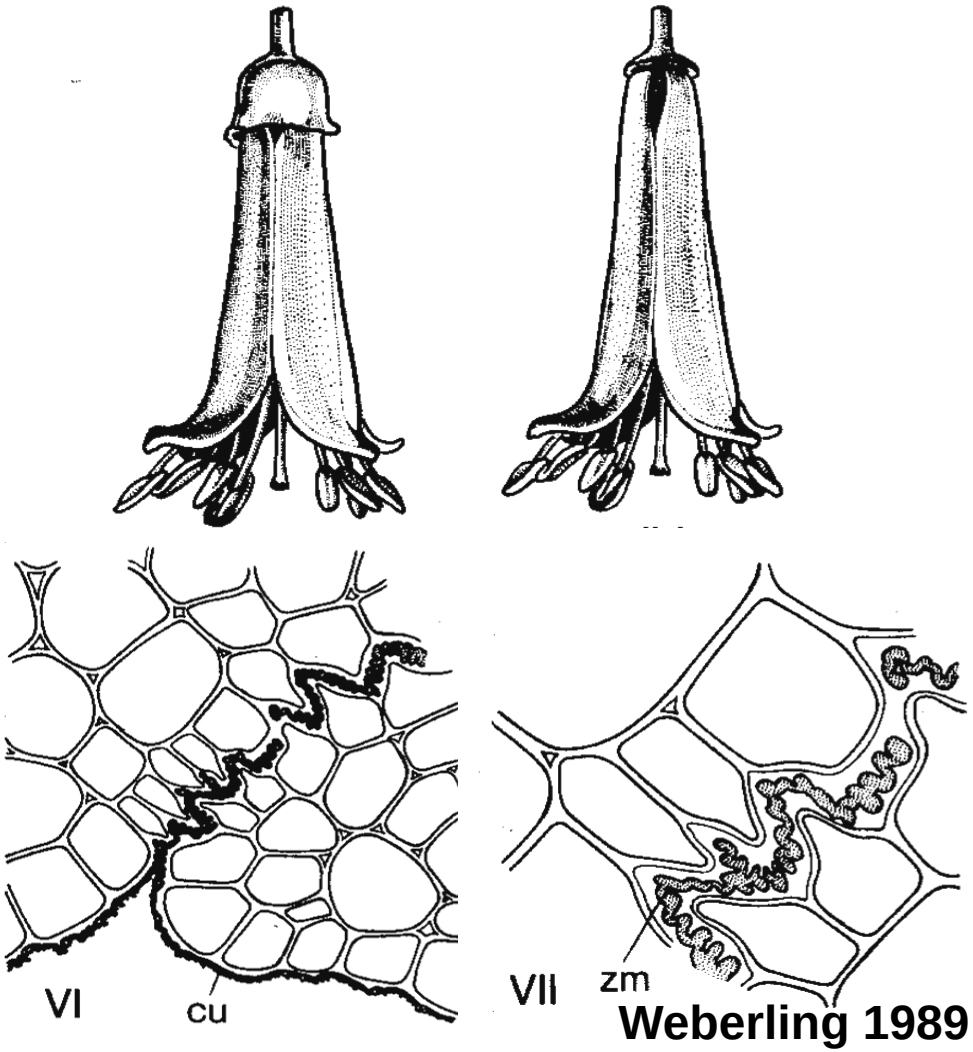
Pirani *et al.* 2010

Galipea carinata



El Ottra et al. em prep.

***Pseudossimpetalia* em *Galipea* é construída de modo diferente do descrito em *Correa* (tribo Boronieae, Rutoideae; pétalas unidas por *dentonação*).**

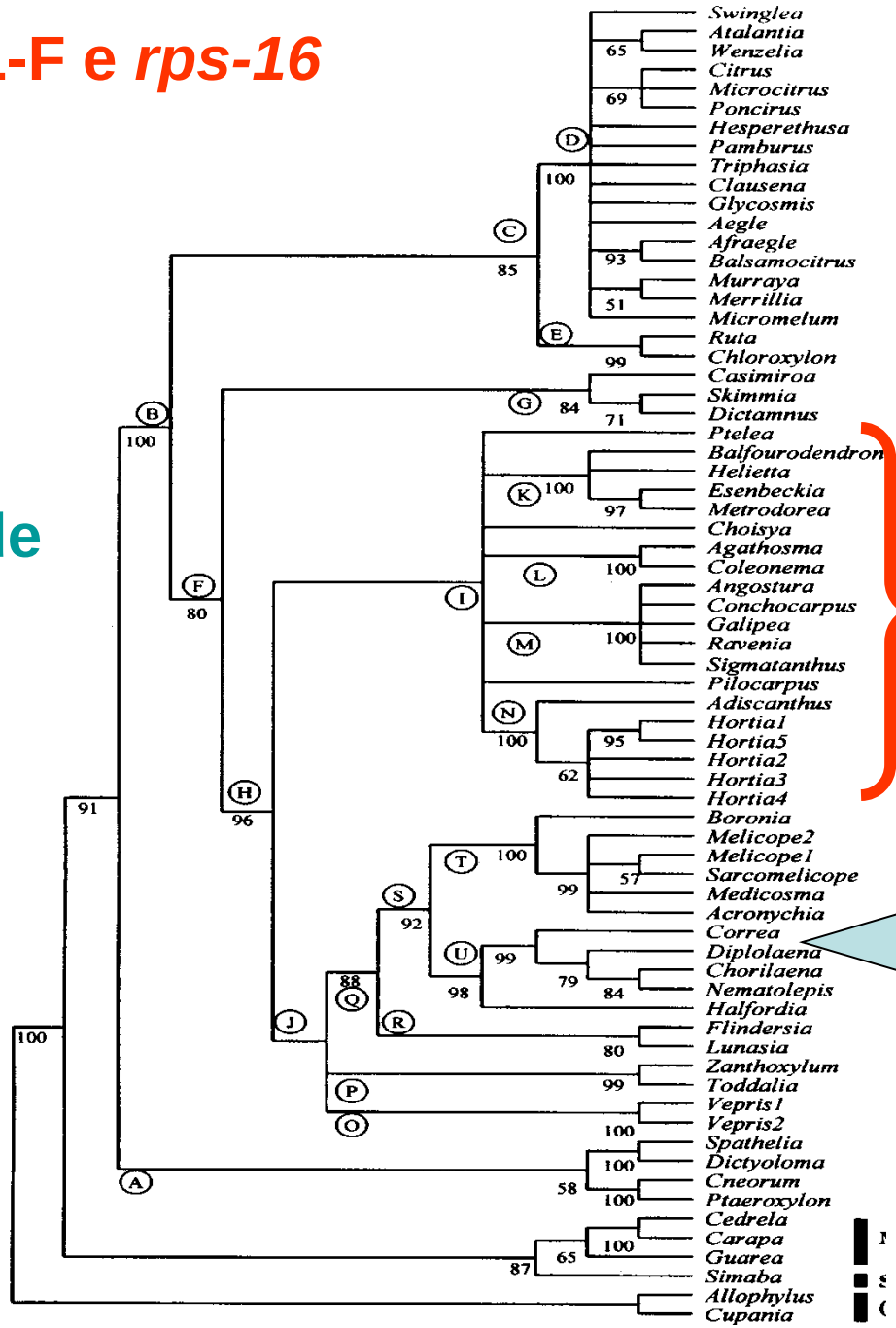


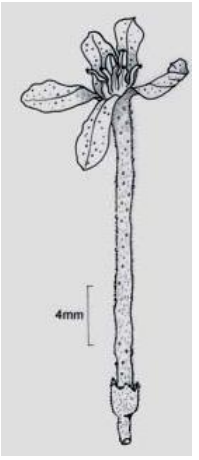
Weberling 1989

RUTACEAE *trn*L-F e *rps-16*

consenso estrito
Groppo et al. 2008

Necessidade de estudos morfológicos acurados!





Galipeeae

Correa

ANACARDIACEAE - resinas

SAPINDALES

mangueira
Mangifera indica

aroeiras
***Schinus* spp.**

ANACARDIACEAE
SAPINDALES

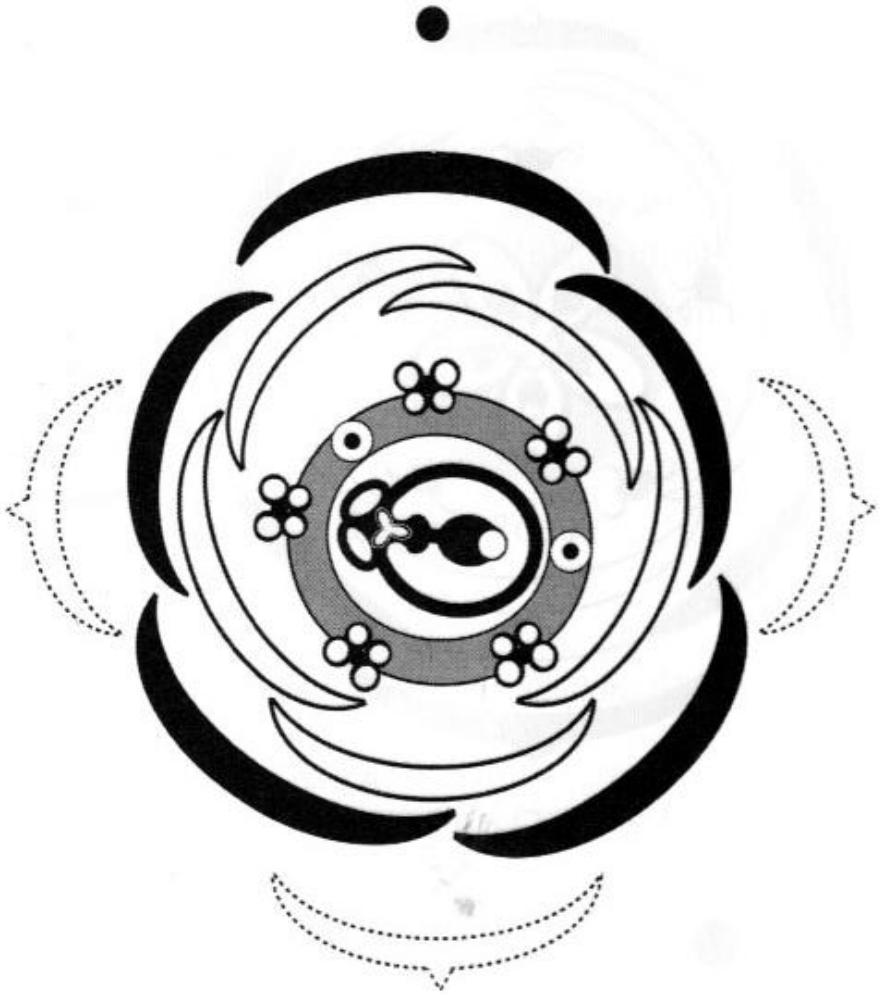


Fig. 10.23. *Toxicodendron vernicifluum* (Anacardiaceae). Particular flower with two staminodes (variable). **Ronse de Craene 2010**

ANACARDIACEAE

SAPINDALES

Anacardium occidentale

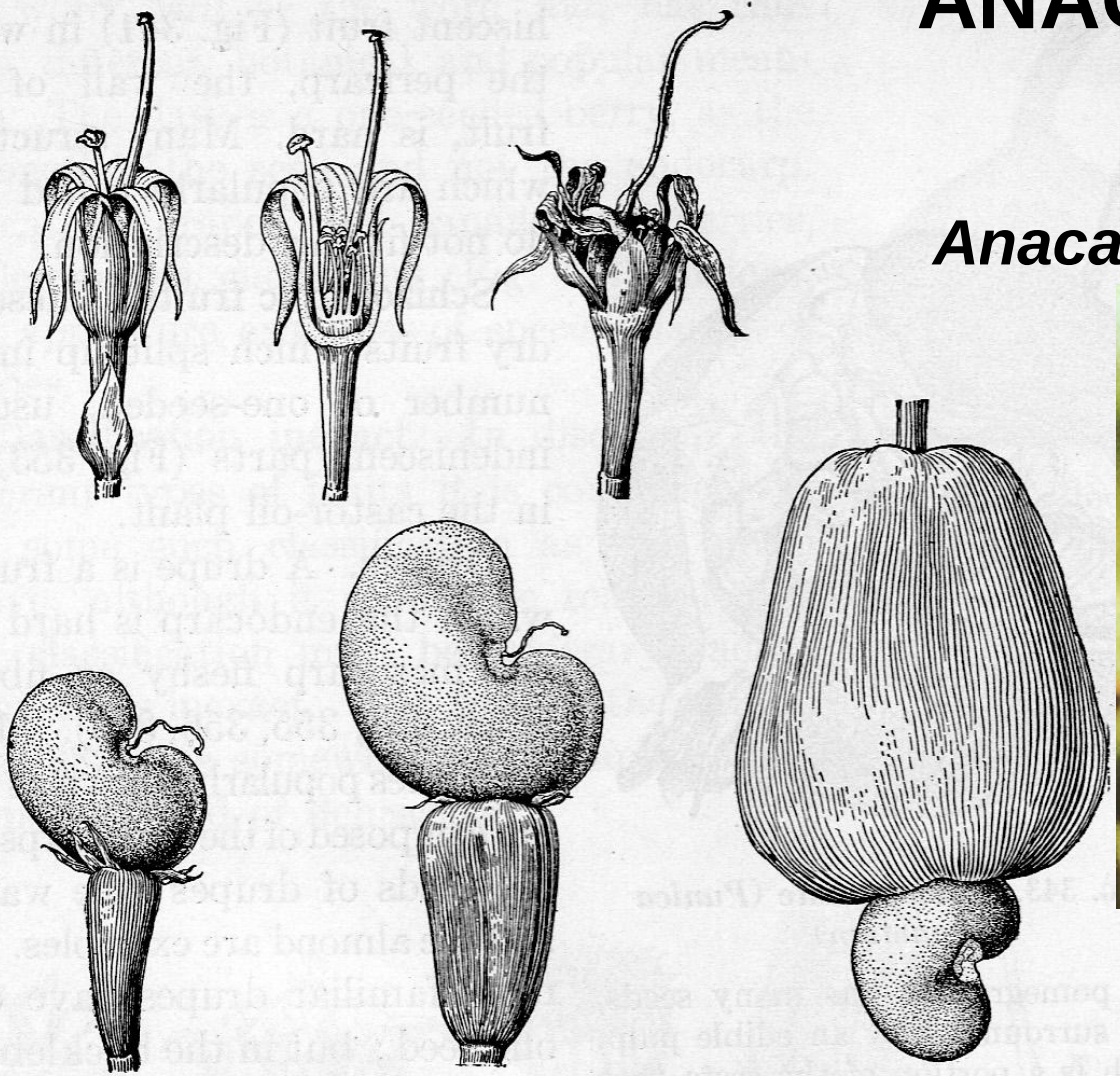


Fig. 341. Development of cashew fruit

Upper left, flower; center, section of a flower, showing ovary surrounded by stamens, one of which is much larger than the others; right, the fertilized ovary has already begun to enlarge; below, further development of nut from ovary and of fleshy portion from stalk and torus

Brown 1935

APG-III 2009

ROSÍDEAS