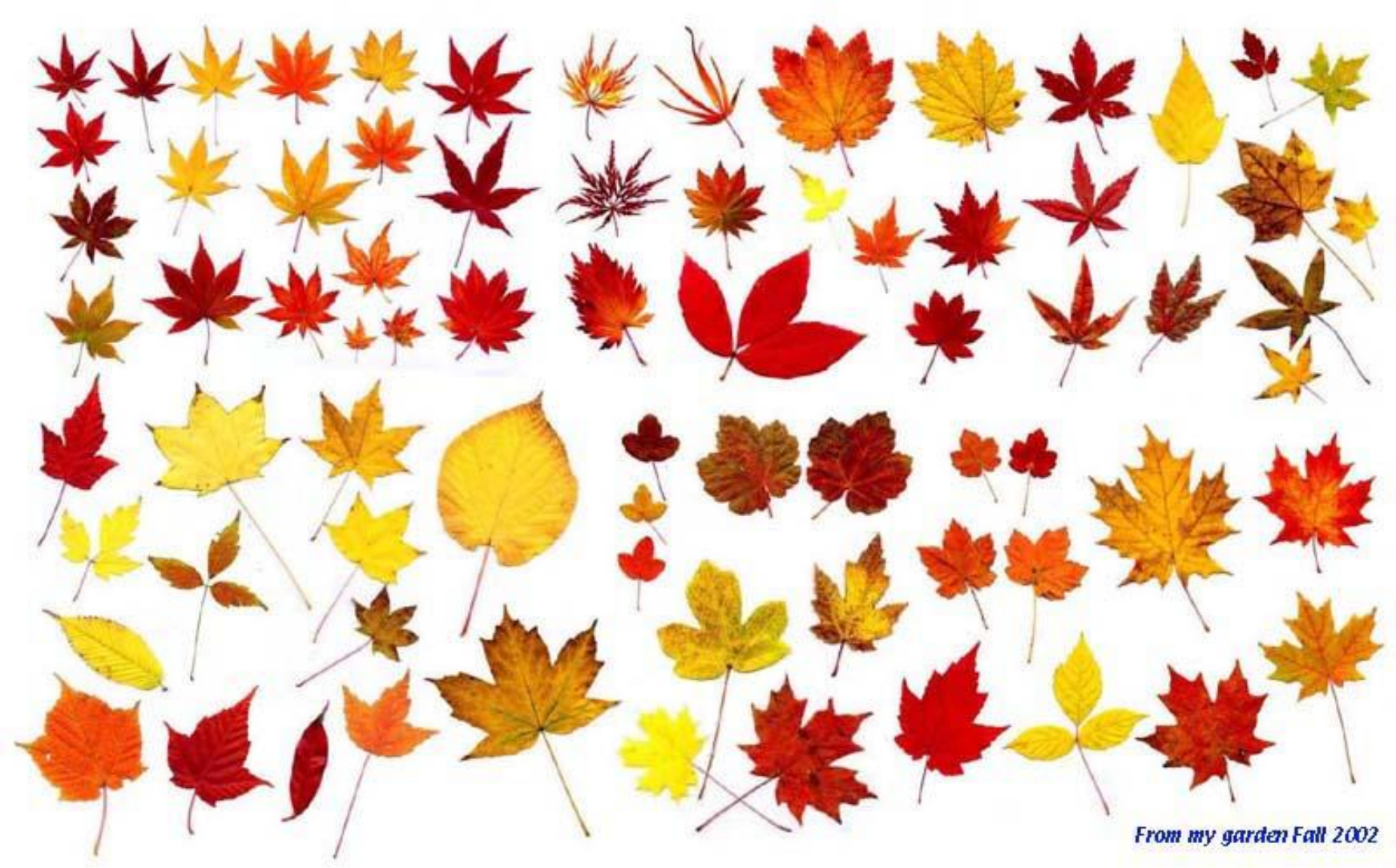
Eulogy for Acer ...

For an all too brief period each autumn the woods of North America and the Orient, and many gardens throughout the temperate world, are ablaze with scarlet, gold, and yellow when maples, the most spectacular of all trees, adorn the countryside. Maples delight the eye, provide one of nature's finest sweets, and hold their own as timber with even the mighty oaks. Throughout the ages people have been enchanted with this magnificent and versatile genus of trees known as *Acer*.

(Oterdoom 1994 : 15)



(Hajime Hayashida)

Morphology and systematics of the genus Acer (Sapindaceae), incl. infrageneric classification

morphology

systematics

genus

Acer

Sapindaceae

IG classification

Acer = ???

- a Taiwan-based computer company

- a genus of trees and shrubs

- *Armored Combat Engineer Robot*, by Mesa Robotics

- *Australian Council for Educational Research*

- David Acer, Canadese stand-up comedian

Acer etymology

ac- **= pointed**

akros **(Greek) = pointed**

acer **(Latin) = sharp**

e.g.

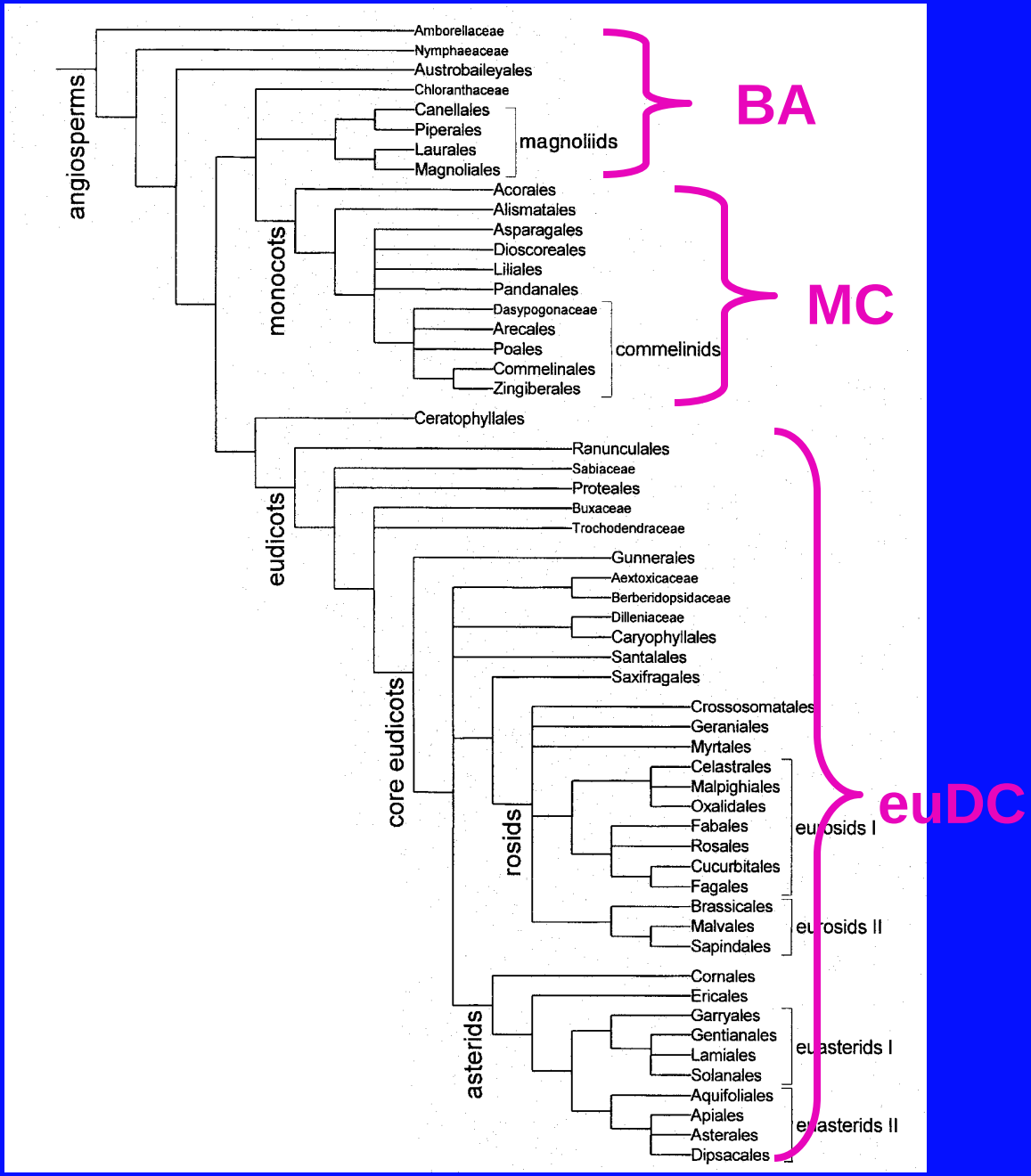
Acanthus

Actinoscirpus **= sedge with star-shaped inflorescence**

Acer **= pointed leaves ? or : extremely hard wood ? (spears !)**

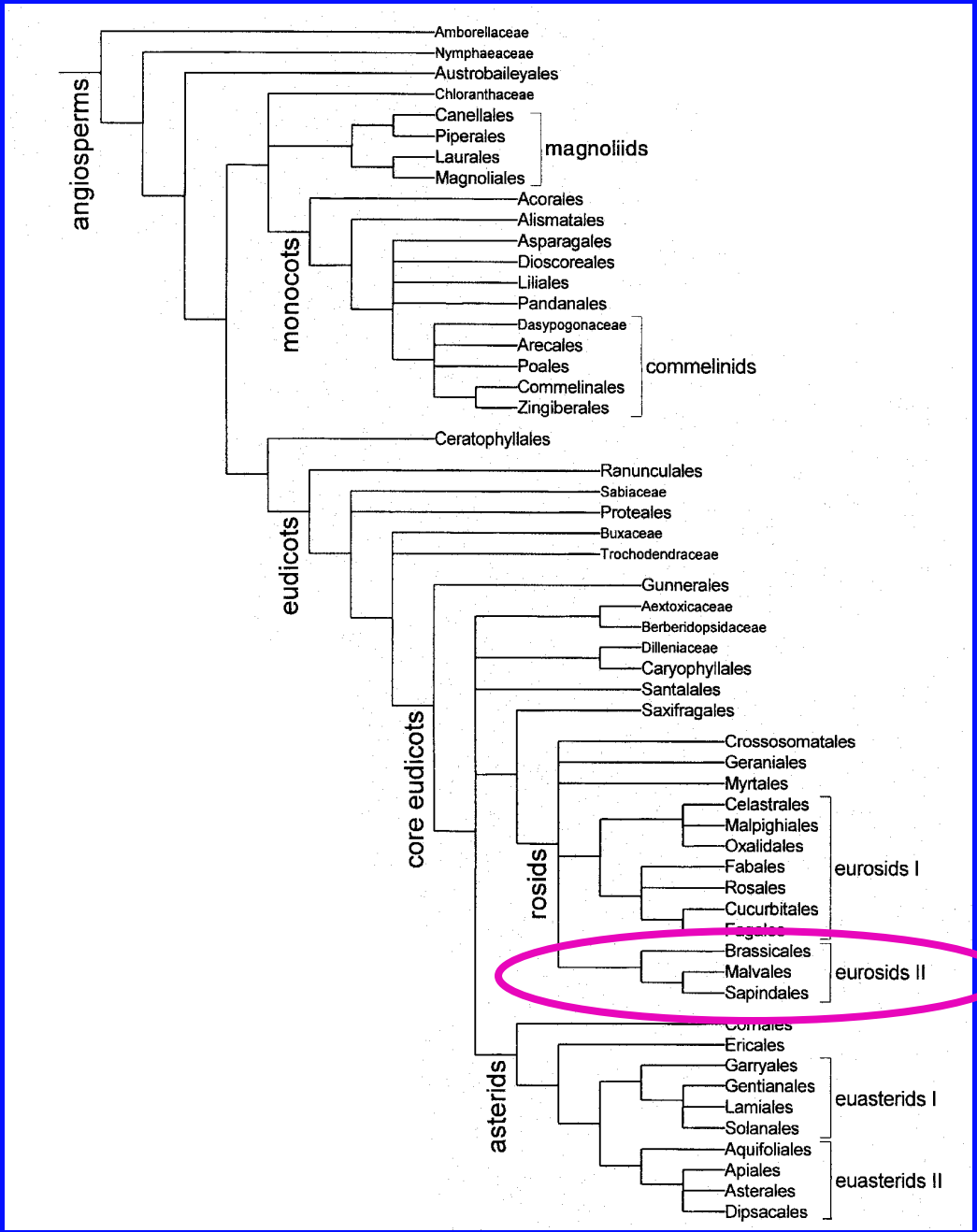
Classification APG II 2003

Angiosperm Phylogeny Group



Classification APG II 2003

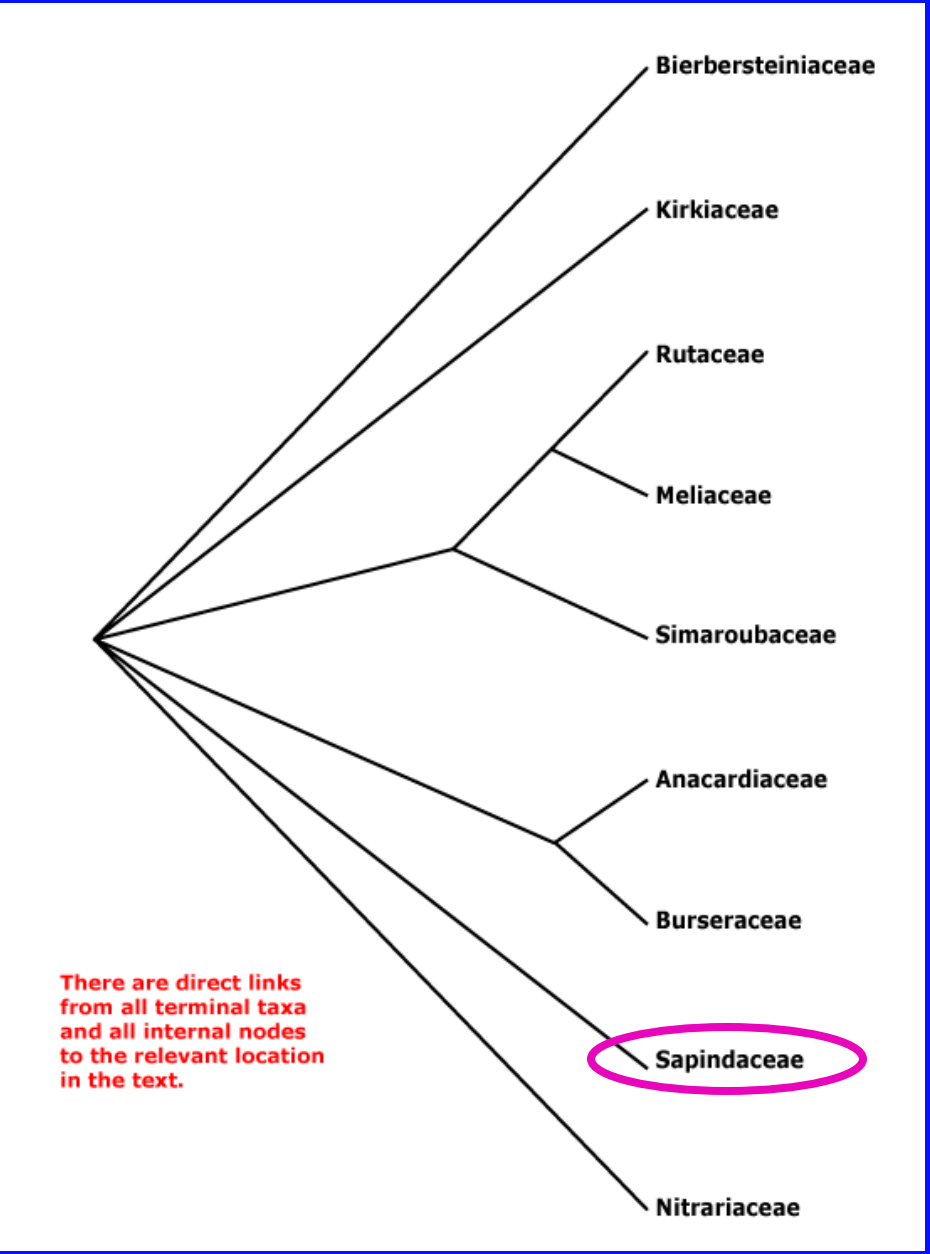
Angiosperm Phylogeny Group



order Sapindales

9 families
460 genera
5670 species

trees with pinnate leaves
noxious secondary metabolites



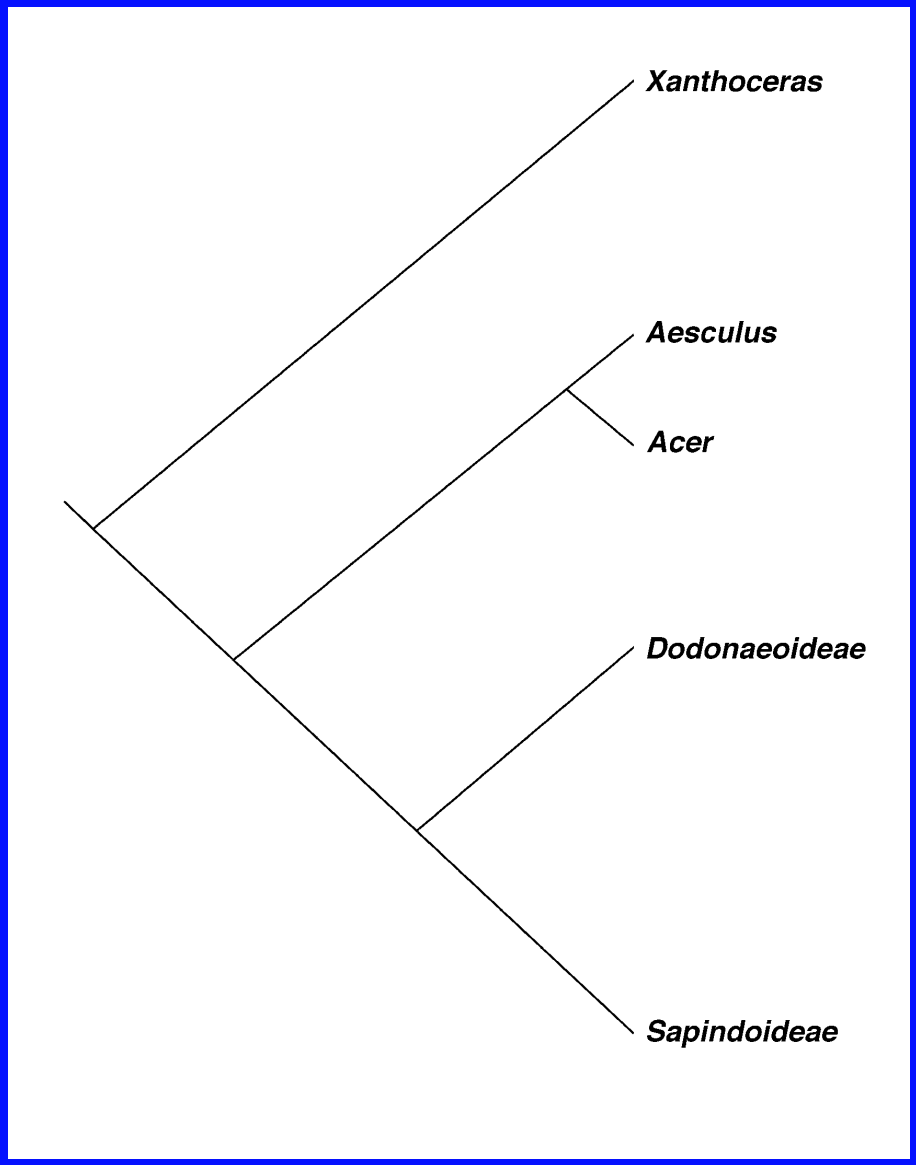
(www.mobot.org/MOBOT/Research/APweb)

Sapindaceae sensu lato :

phylogeny

area

APWeb 2007



(after Harrington et al. 2005, Syst.Bot. 30)

Genera in Sapindaceae

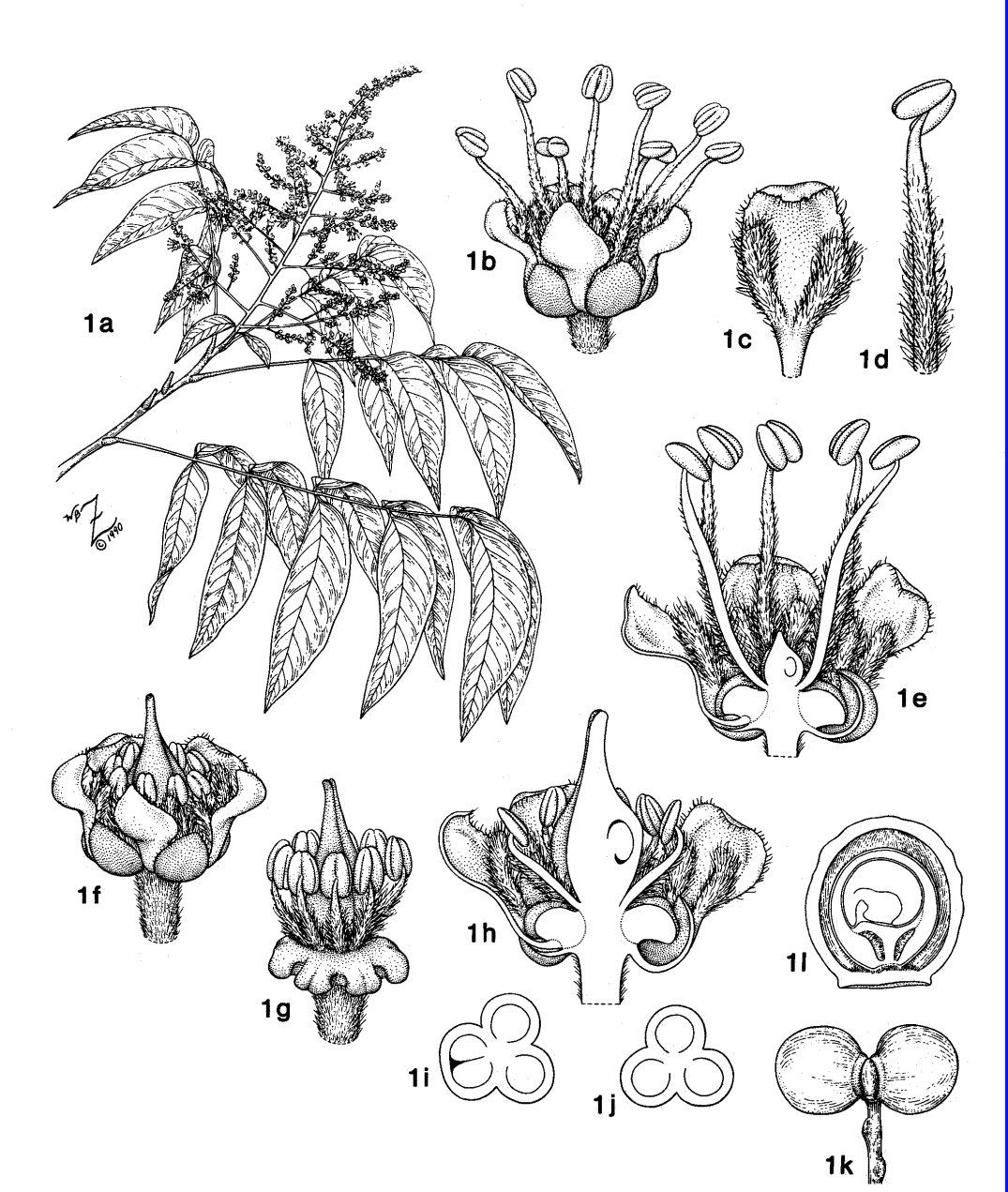
Sapindus mukorossi	**Soapberry tree**
Dodonaea viscosa	**Hop bush**
Koelreuteria paniculata	**Golden rain tree**
Litchi sinensis	**Leechee**
Nephelium lappaceum	**Rambutan**
Xanthoceras sorbifolium	**Yellow horn**

Aesculus
Acer

Sapindus marginatus

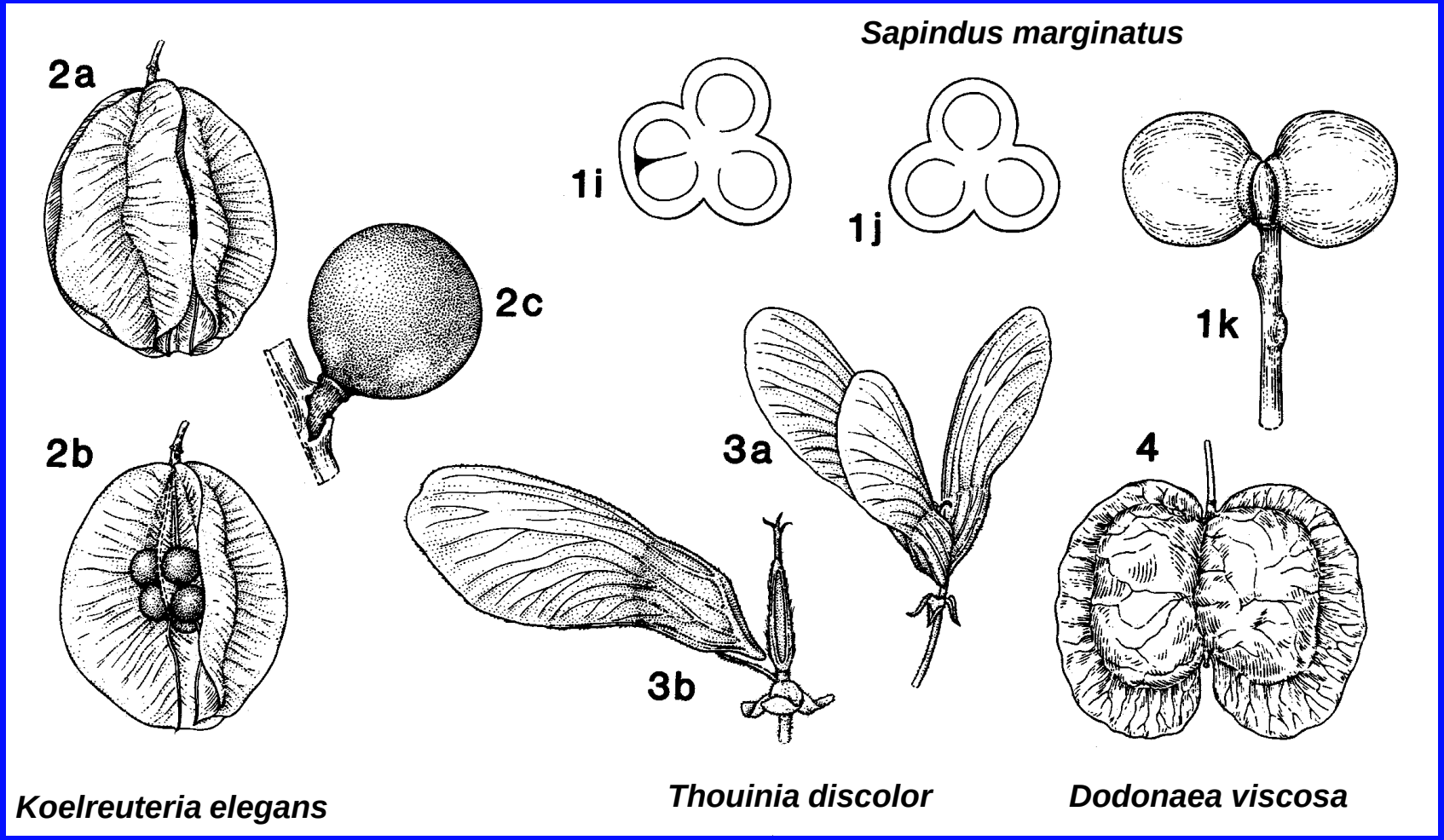
leaves and flowers

S 5
P 5
A 8
disc
G (3)



(Zomlefer 1994)

Sapindaceae fruits



(Zomlefer 1994)

Acer fruits

samarae often in threes

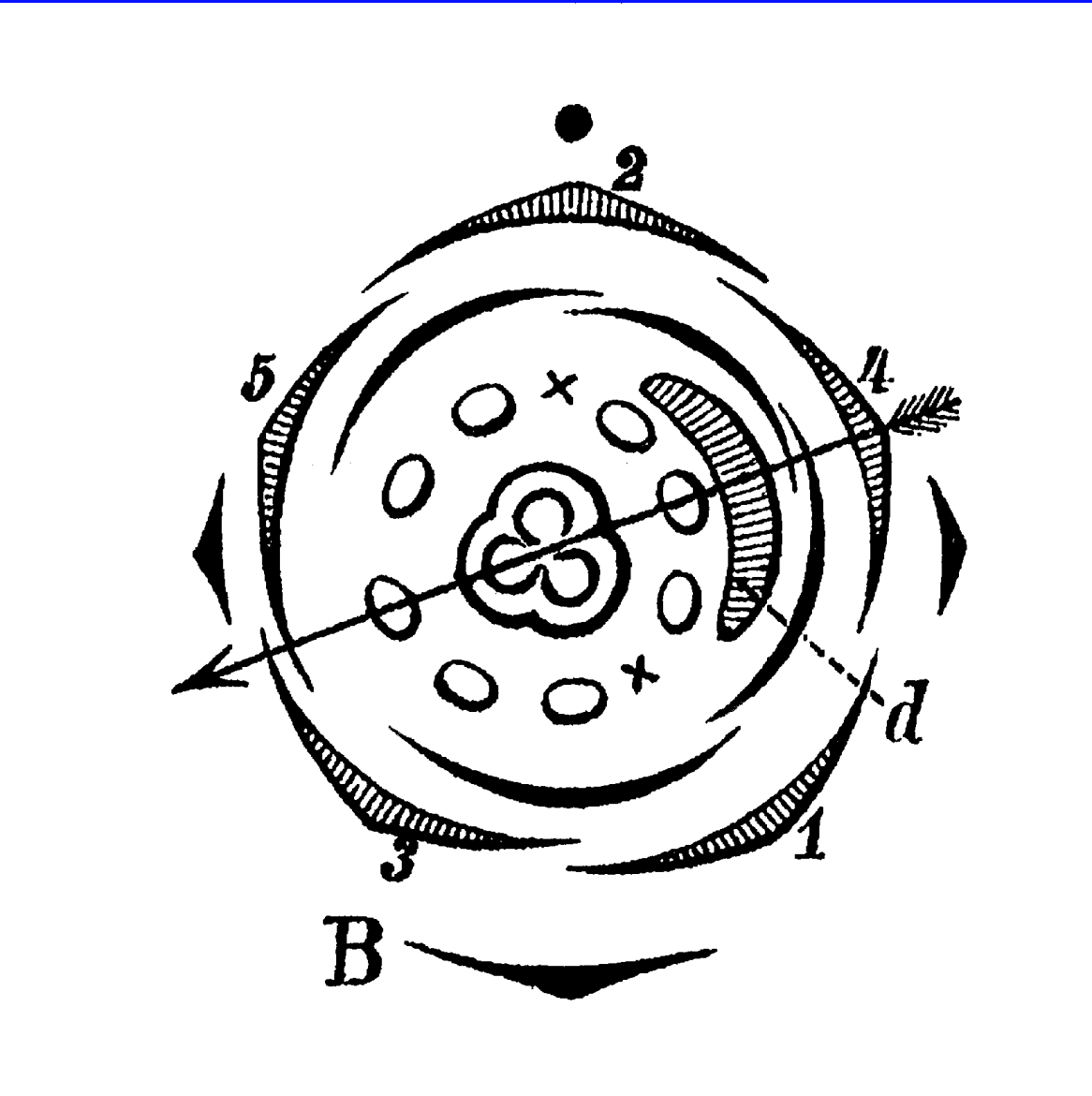
Pax 1885 :
- *Acer negundo*
- *Acer platanoides*
- *Acer pseudoplatanus*
- *Acer rubrum*
- *Acer spicatum*
- *Acer tataricum*

van Gelderen 1994 :
- *Acer macrophyllum*

Deng, Wei & Fan 2003 :
- *Acer trialatum* (= *Acer buergerianum*)

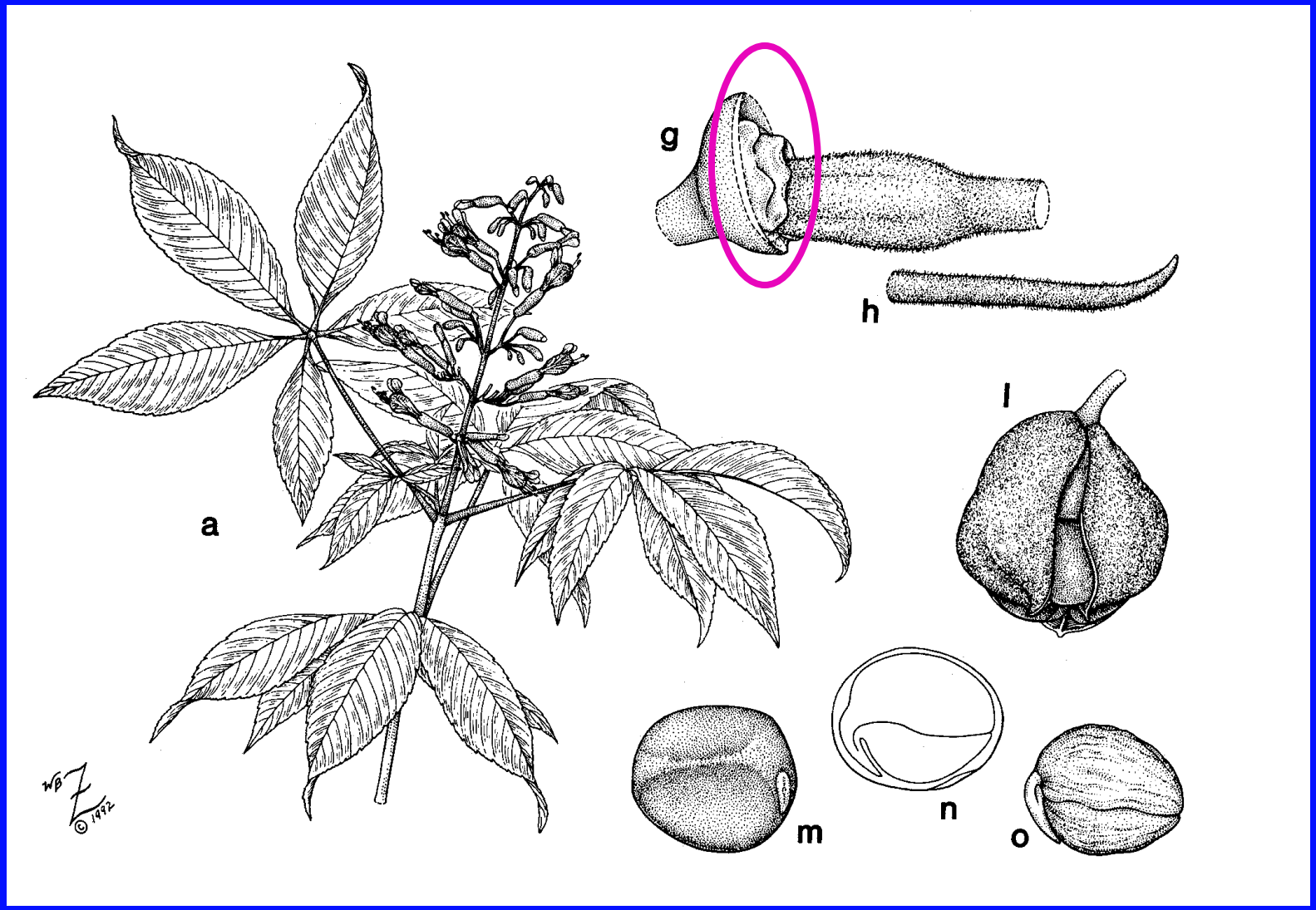
Floral diagram Serjania

S 5
P 5
disc
A 8
G (3)



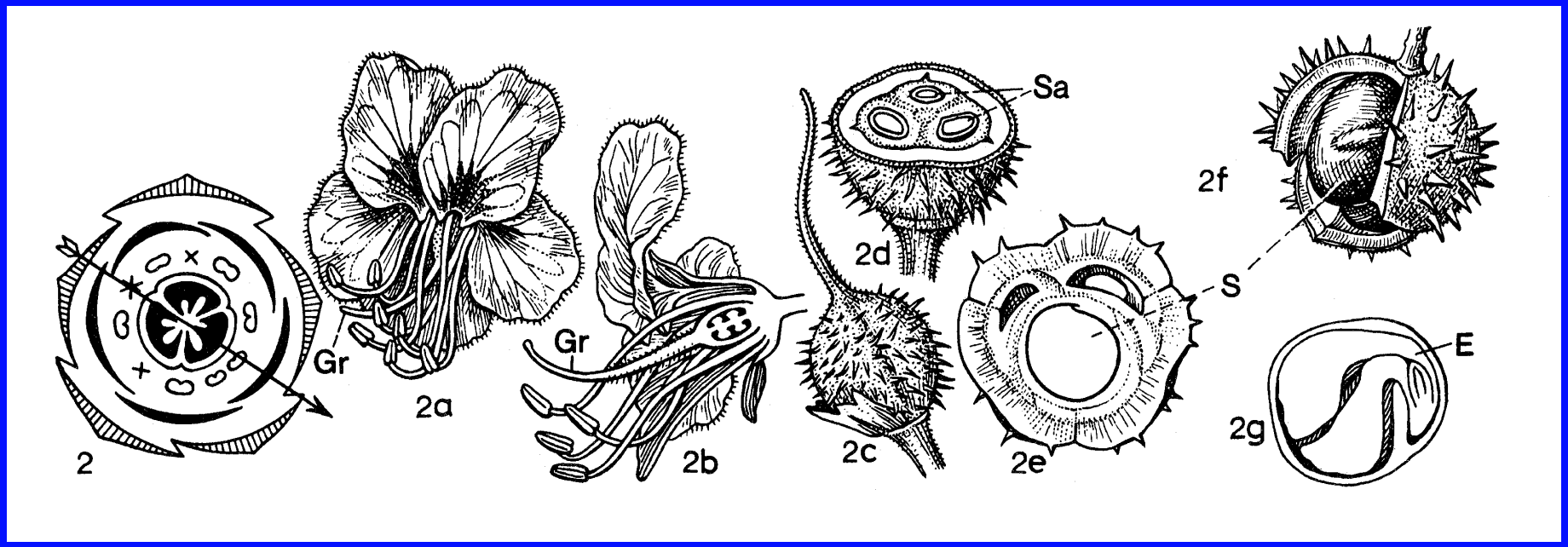
(Eichler 1875)

Aesculus pavia : leaves decussate, 5-palmate



(Zomlefer 1994)

Aesculus hippocastanum : floral structures & diagram



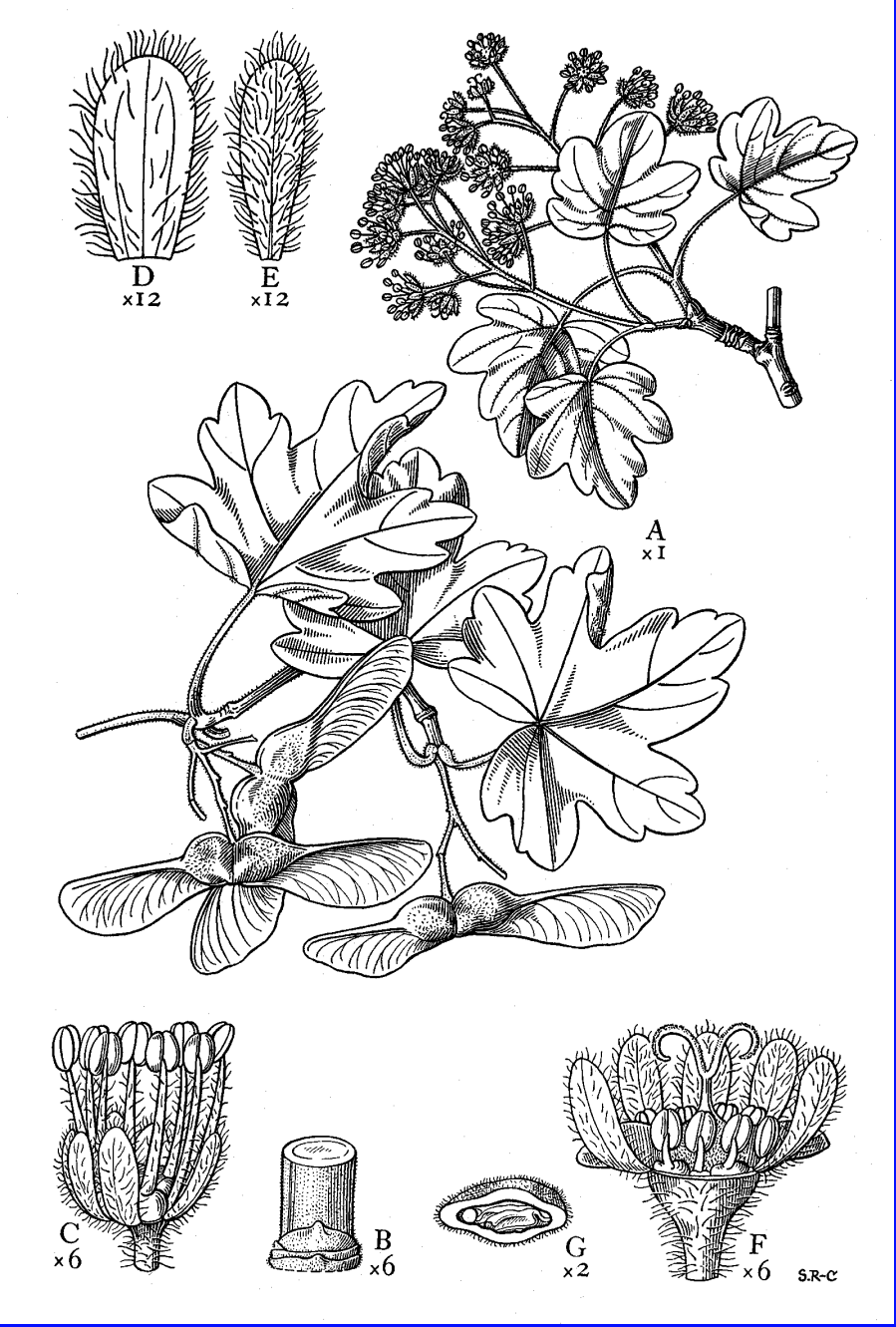
(Graf 1975)

S 5
P 5
A 8
G (3)

Acer campestre

leaves decussate
leaves palmately 5-lobed

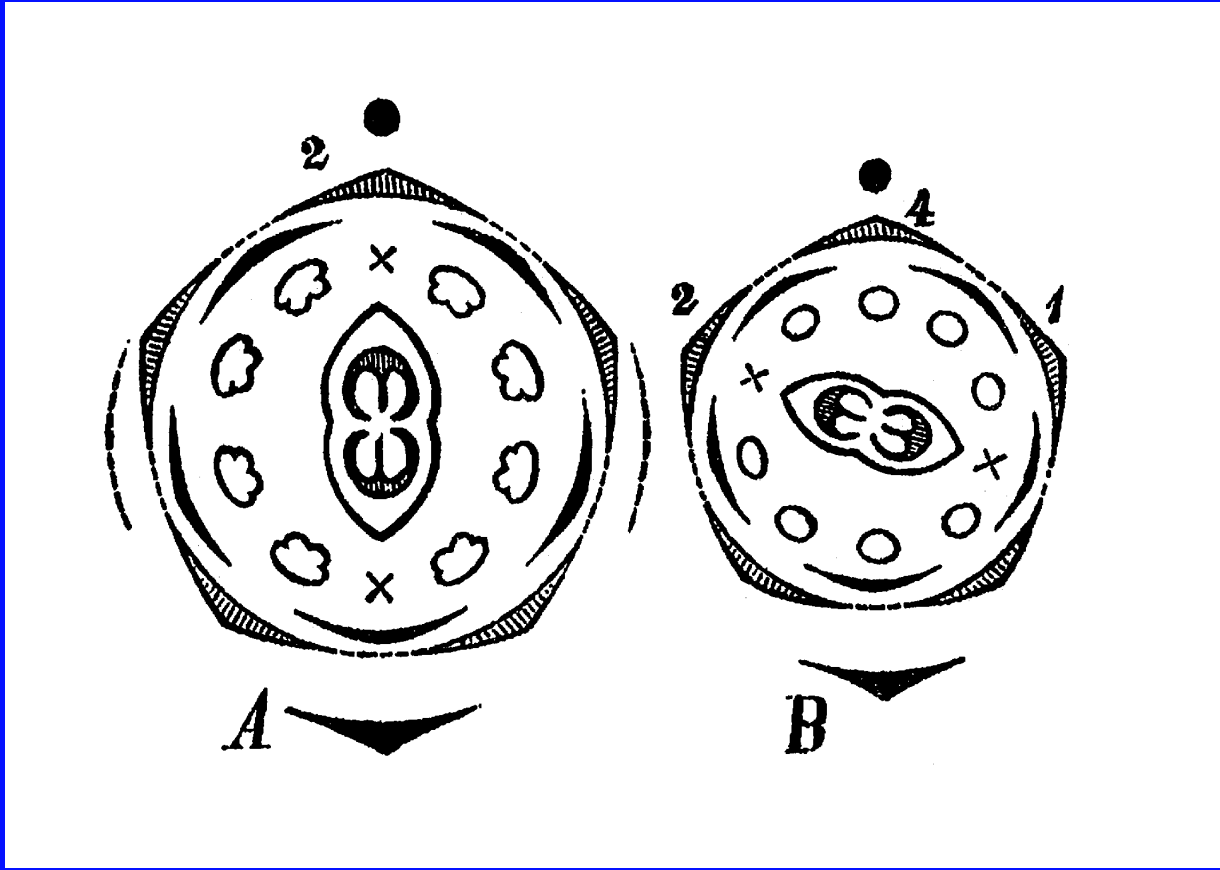
S 5
P 5
disc
A 8
G (2)



(Ross-Craig 1979)

Acer pseudoplatanus

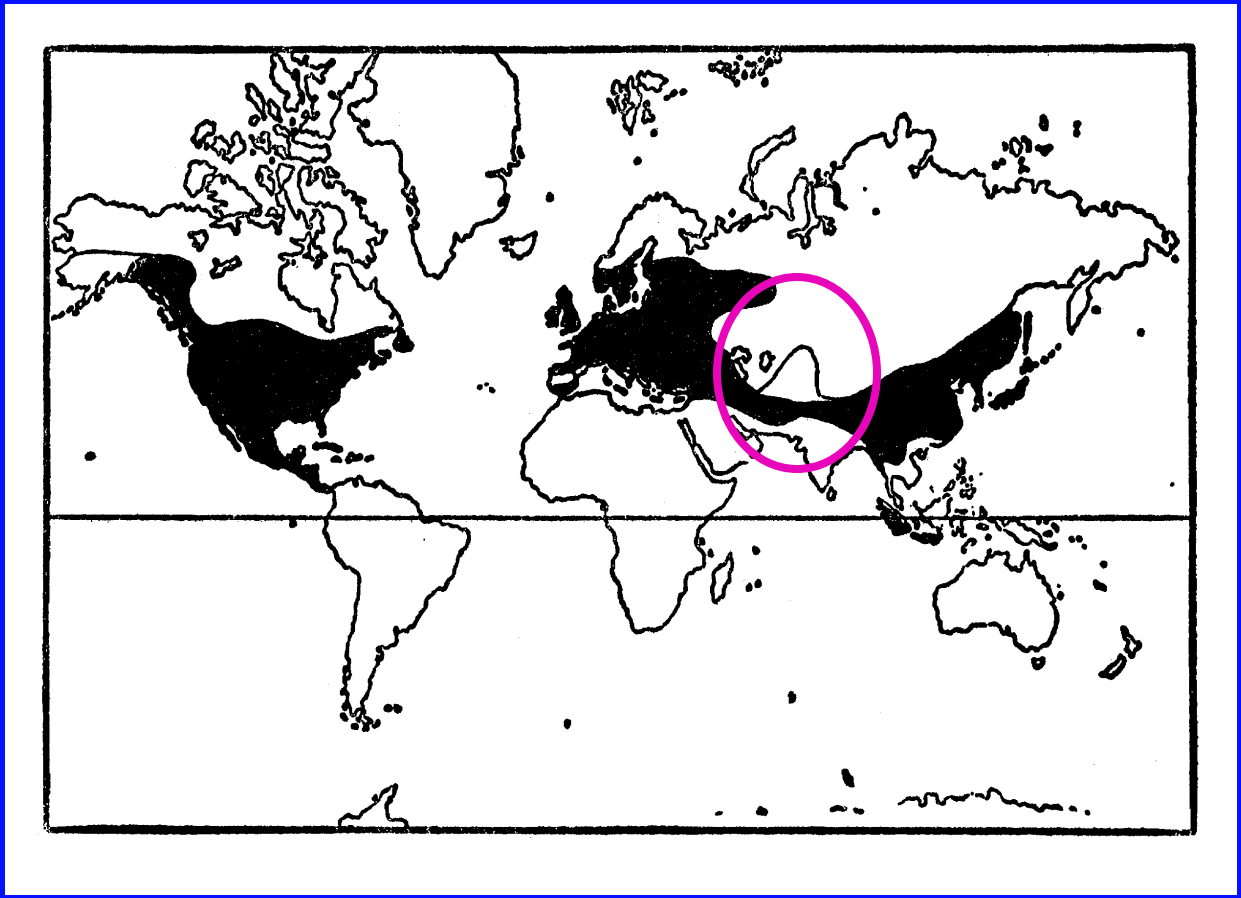
S 5
P 5
disc
A 8
G (2)



(Eichler 1875)

The genus Acer

Acer area



(Krüssmann 1976)

Linnaeus 1753, Species Plantarum

9 species :

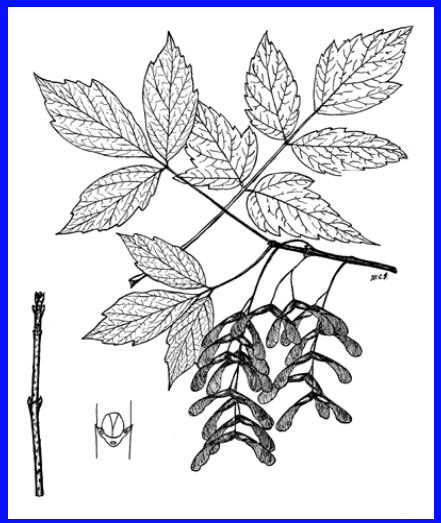
Acer tataricum
Acer pseudoplatanus **(lectotype)**
Acer rubrum
Acer saccharinum
Acer platanoides
Acer pensylvanicum
Acer campestre
Acer monspessulanum
Acer negundo

van Gelderen, de Jong & Oterdoom 1994, Maples of the World :

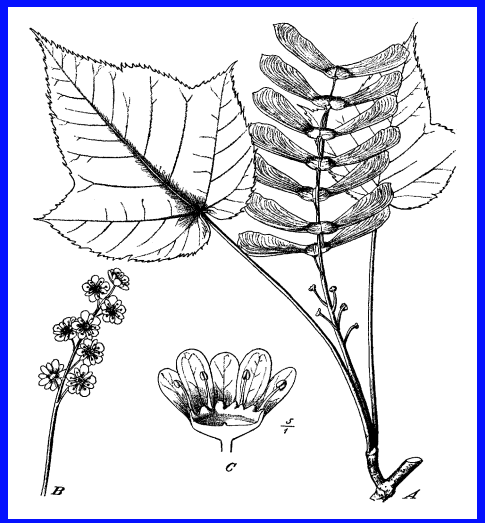
16 sections (+ 11 subsections)

124 species (+ 67 subspecies)

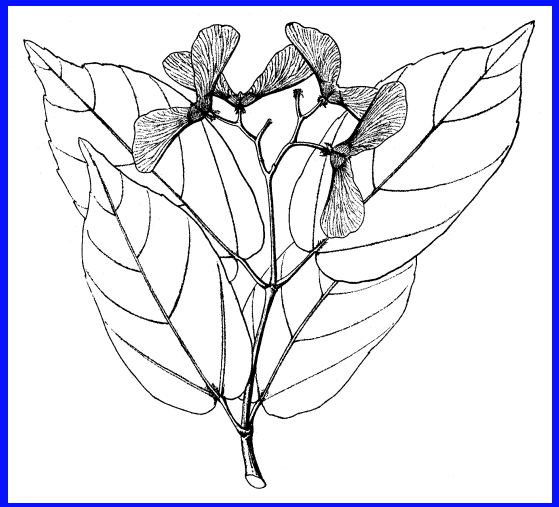
Acer leaves



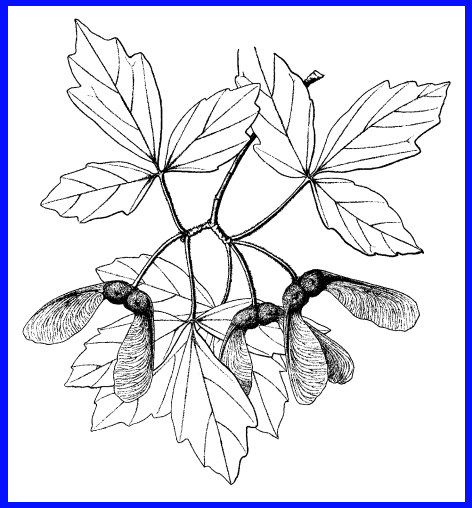
Acer negundo



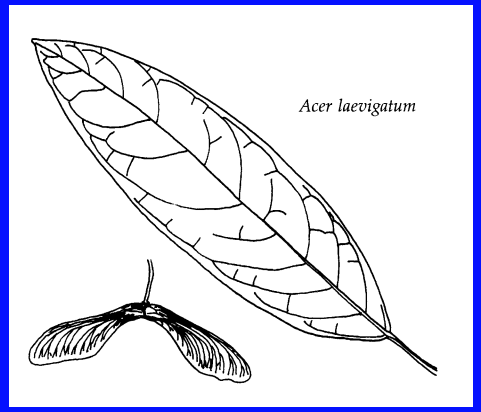
Acer pectinatum



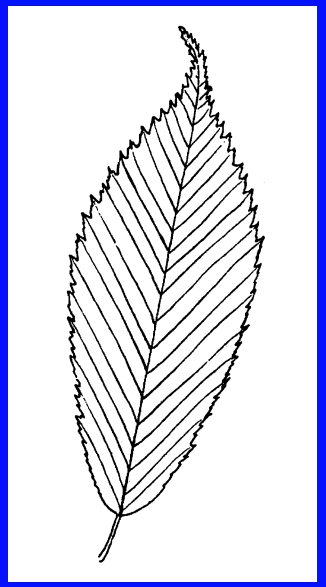
Acer cordatum



Acer griseum

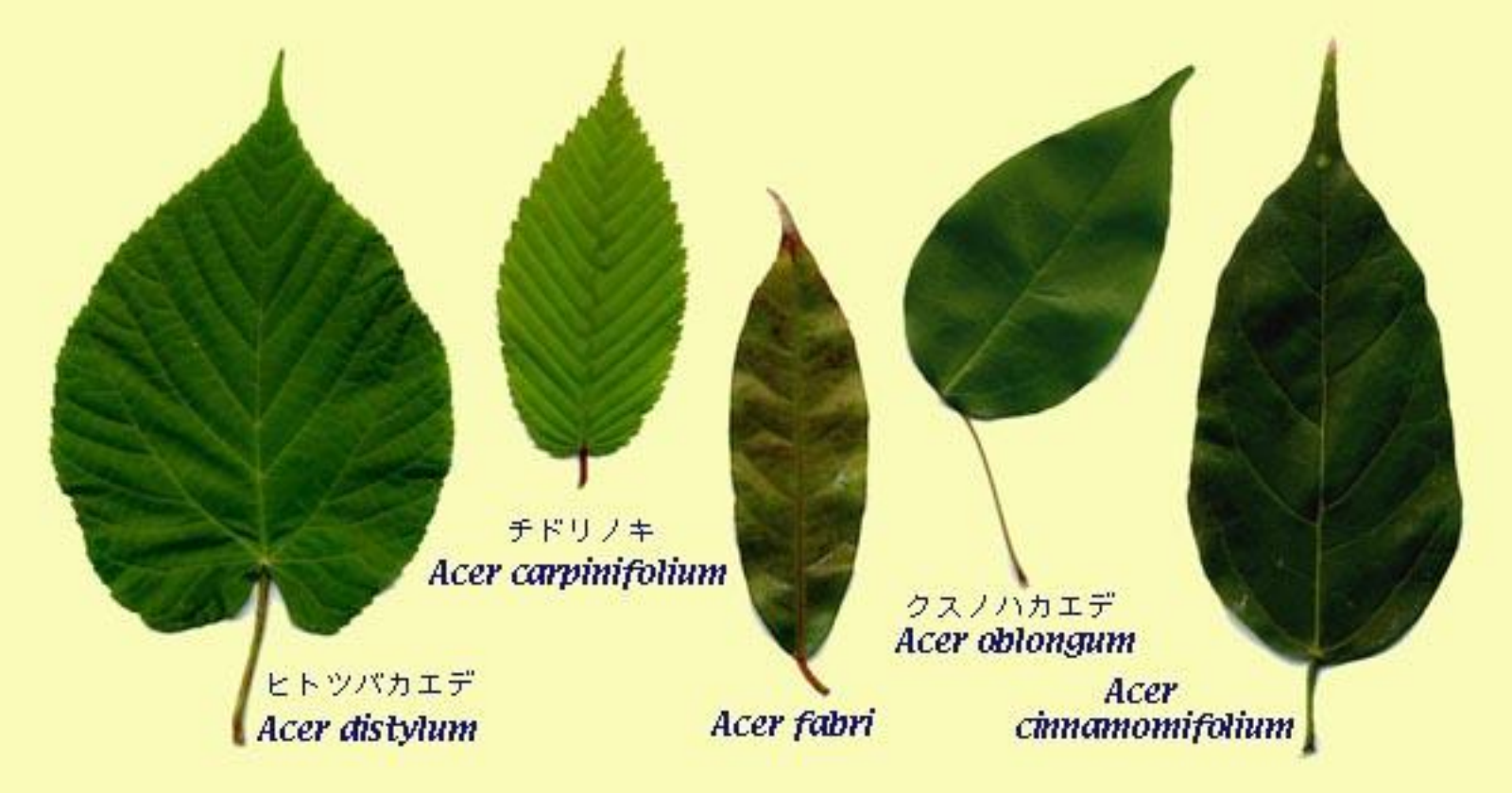


Acer laevigatum



Acer carpinifolium

Acer leaves, unlobed



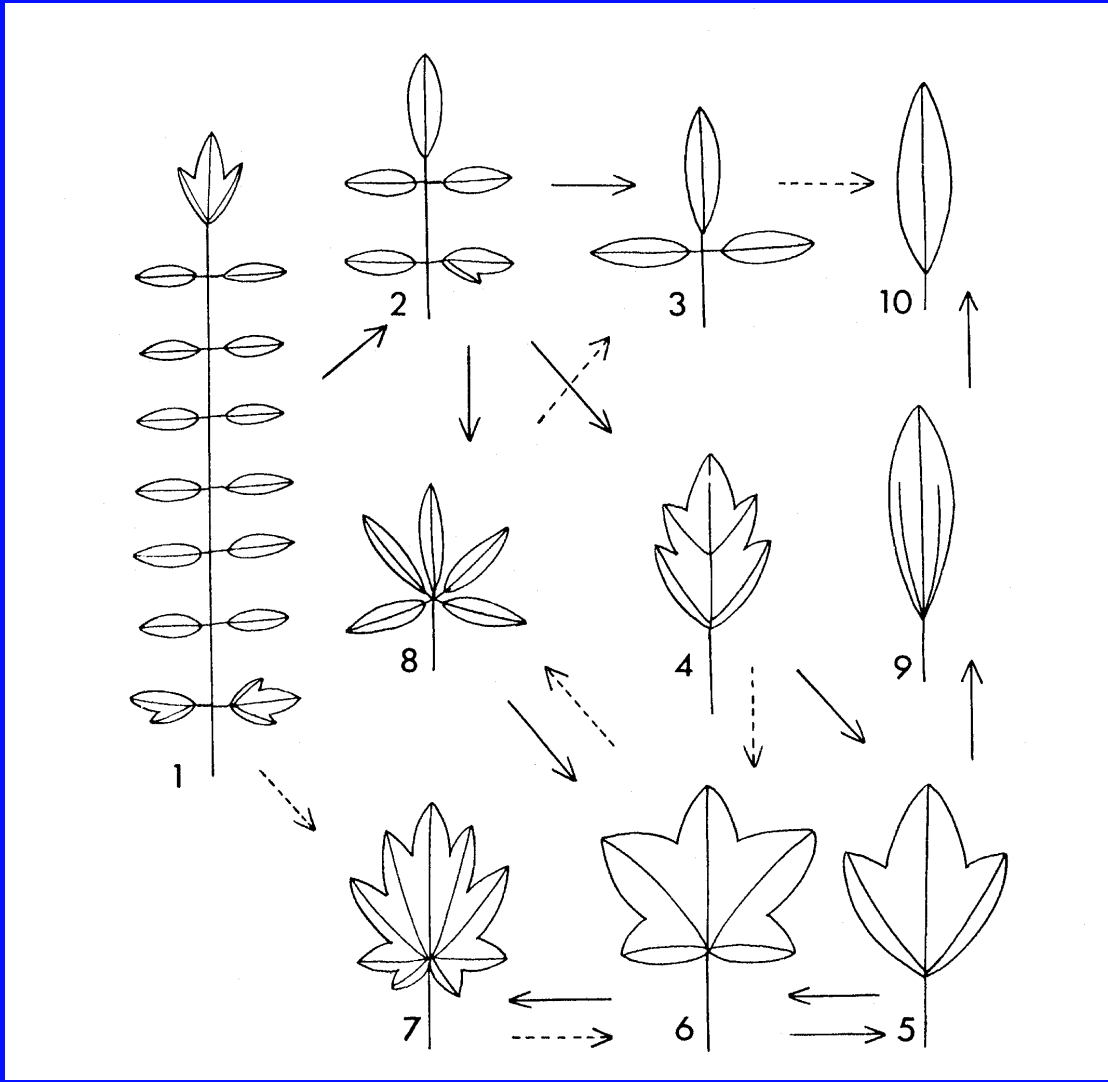
(Hajime Hayashida)

Acer carpinifolium, leaves unlobed

Acer maximowiczianum, leaves trifoliolate

Semophylesis of the leaves

Dipteronia



Acer

(Oterdoom & de Jong 1994)

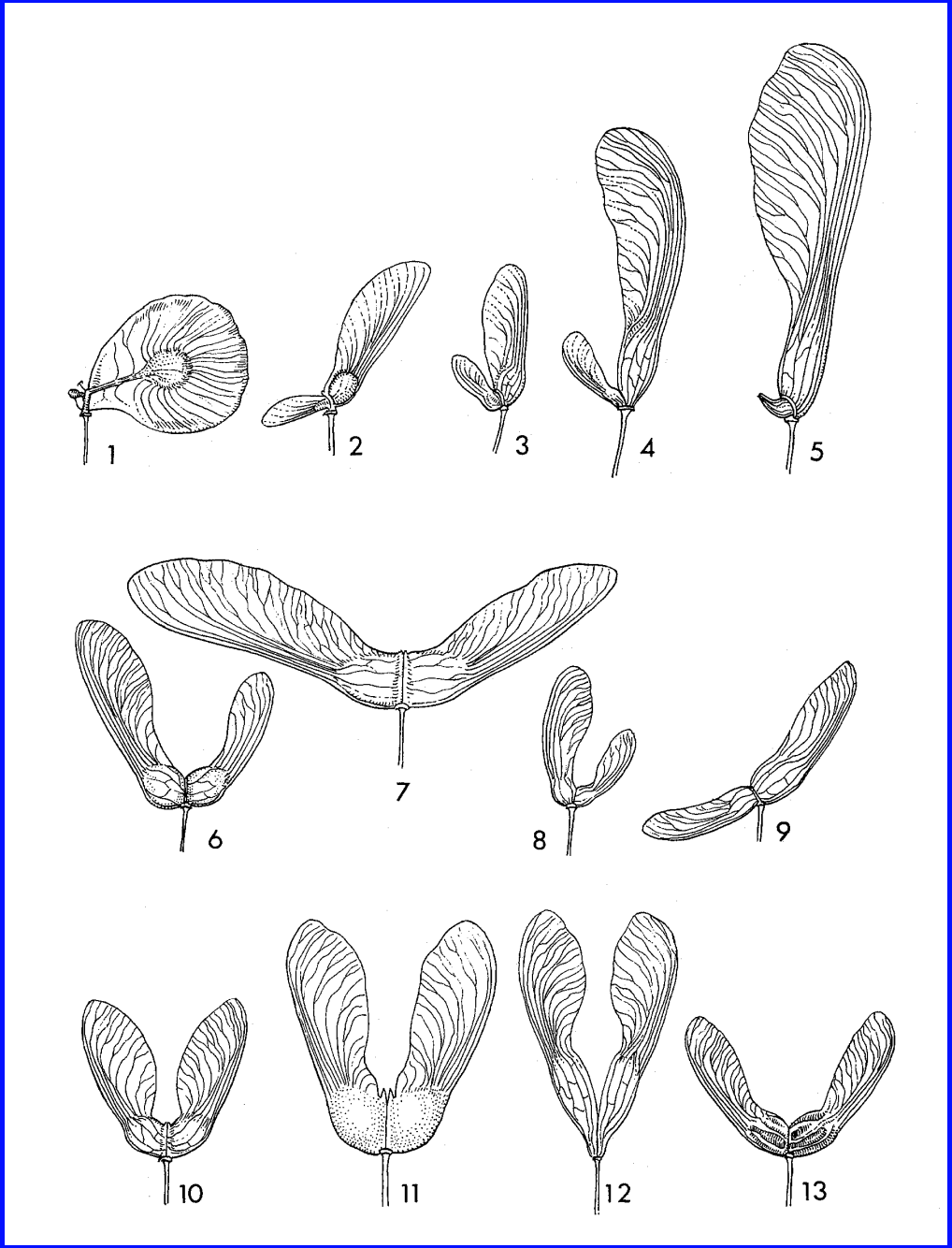
Dipteronia : leaves decussate, imparipinnate

Acer pentaphyllum : leaves decussate, 5-palmate

Acer pubipalmatum : seedling leaves 5-palmate

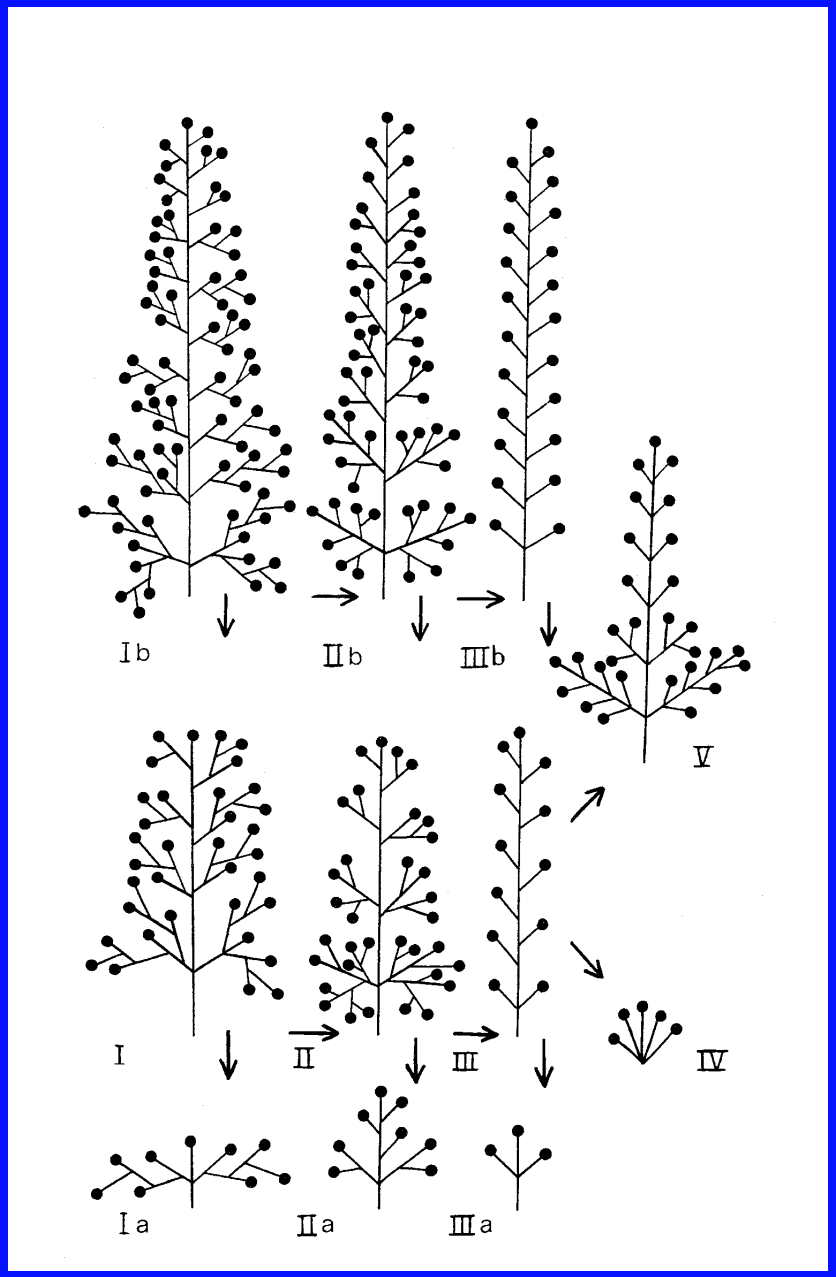
Fruits of Dipteronia sinensis & Acer

parthenocarpy !



(de Jong 1994)

Semophylesis of the inflorescences



(Oterdoom & de Jong 1994)

Flowering types

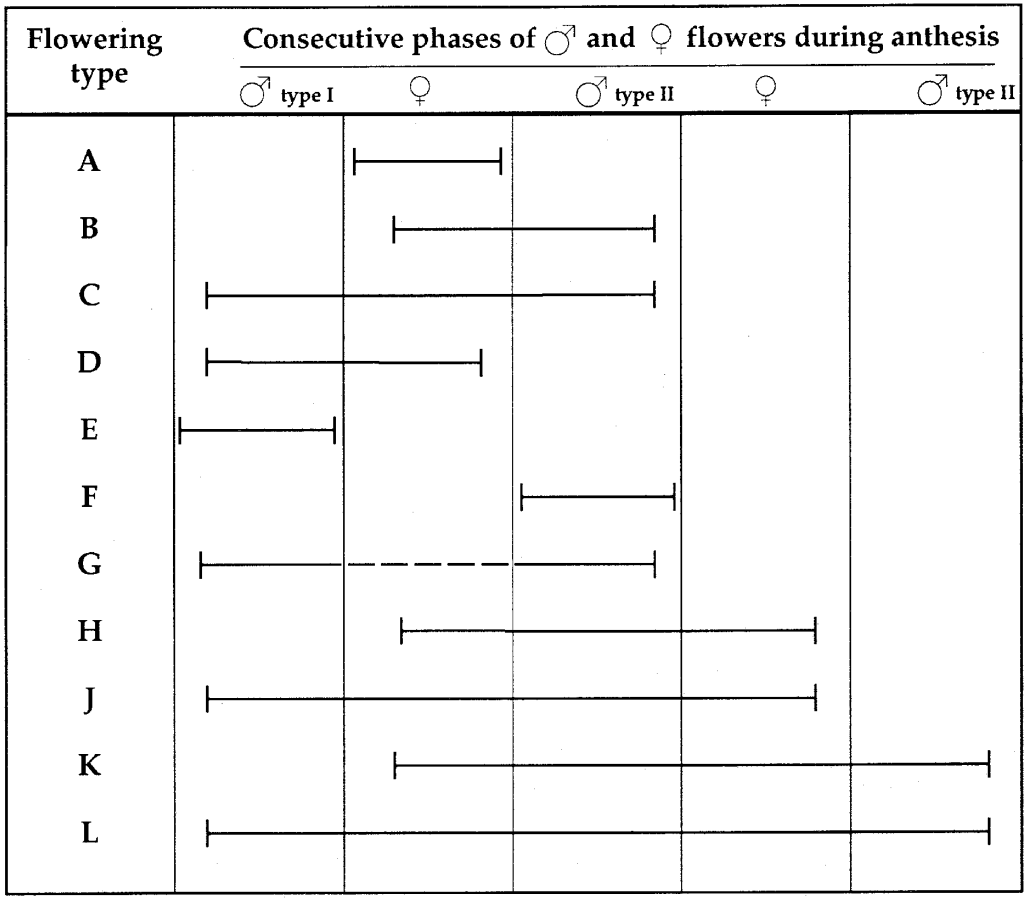


FIGURE 6.3. Flowering types of *Acer* inflorescences: A = inflorescence consists of female flowers; B = inflorescence produces female flowers first followed by phase of male flowers; C = inflorescence produces flowers in three sonsecutive phases—male–female–male; D = inflorescence produces male flowers first followed by phase of female flowers; E = inflorescence consists of male flowers; F = inflorescence consists of type II male flowers, mostly found together with flowering type B. Line length, representing a single inflorescence, gives no correlation with the real size of number of flowers. Sources: A, C, E (p.p.) after Wittrock (1886); B, D after Wittrock (1886), modified by Correns (1928).

(de Jong 1994)

Flowering of Acer pseudoplatanus

duodichogamy

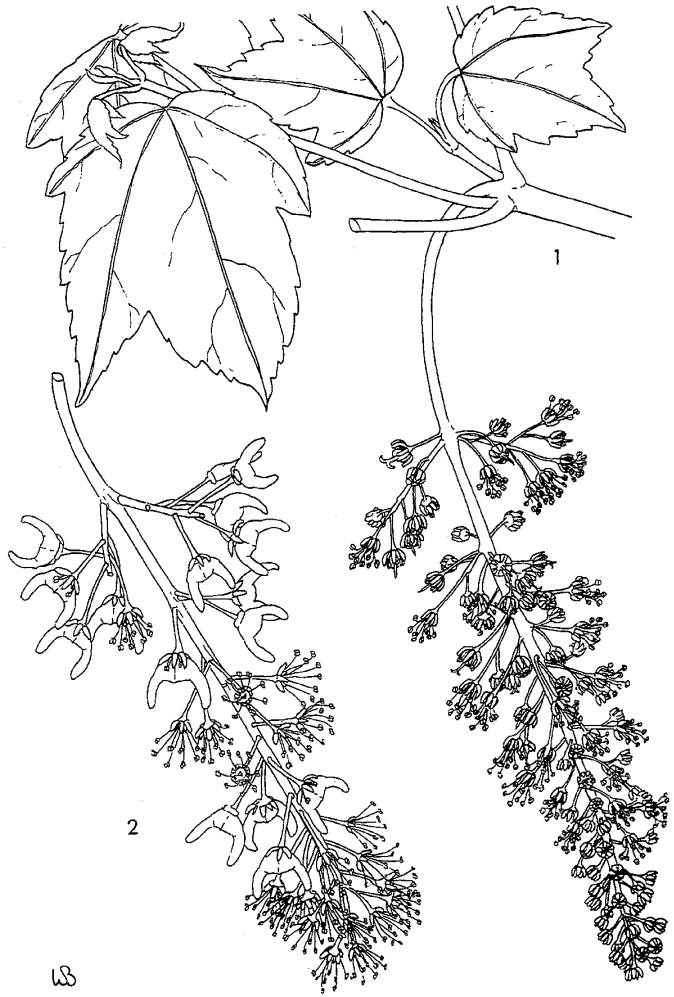


FIGURE 4.2. *Acer pseudoplatanus* L. is an example of duodichogamy (flowering type C): (1) flowering branchlet with inflorescence at the end of the ♂$_{I}$ phase (22 May 1969); and (2) inflorescence during ♂$_{II}$ phase (3 June 1969). ×1. [Wag. B. G. no. 11480.]

(Oterdoom & de Jong 1994)

Flower types

MacLeod (1894) was the first to discover that the ovaries in male flowers, produced before a female phase, were more radically reduced than those produced in male flowers following the female phase. De Jong (1976) called these two types male I and male II, respectively.

(de Jong 1994 : 95)

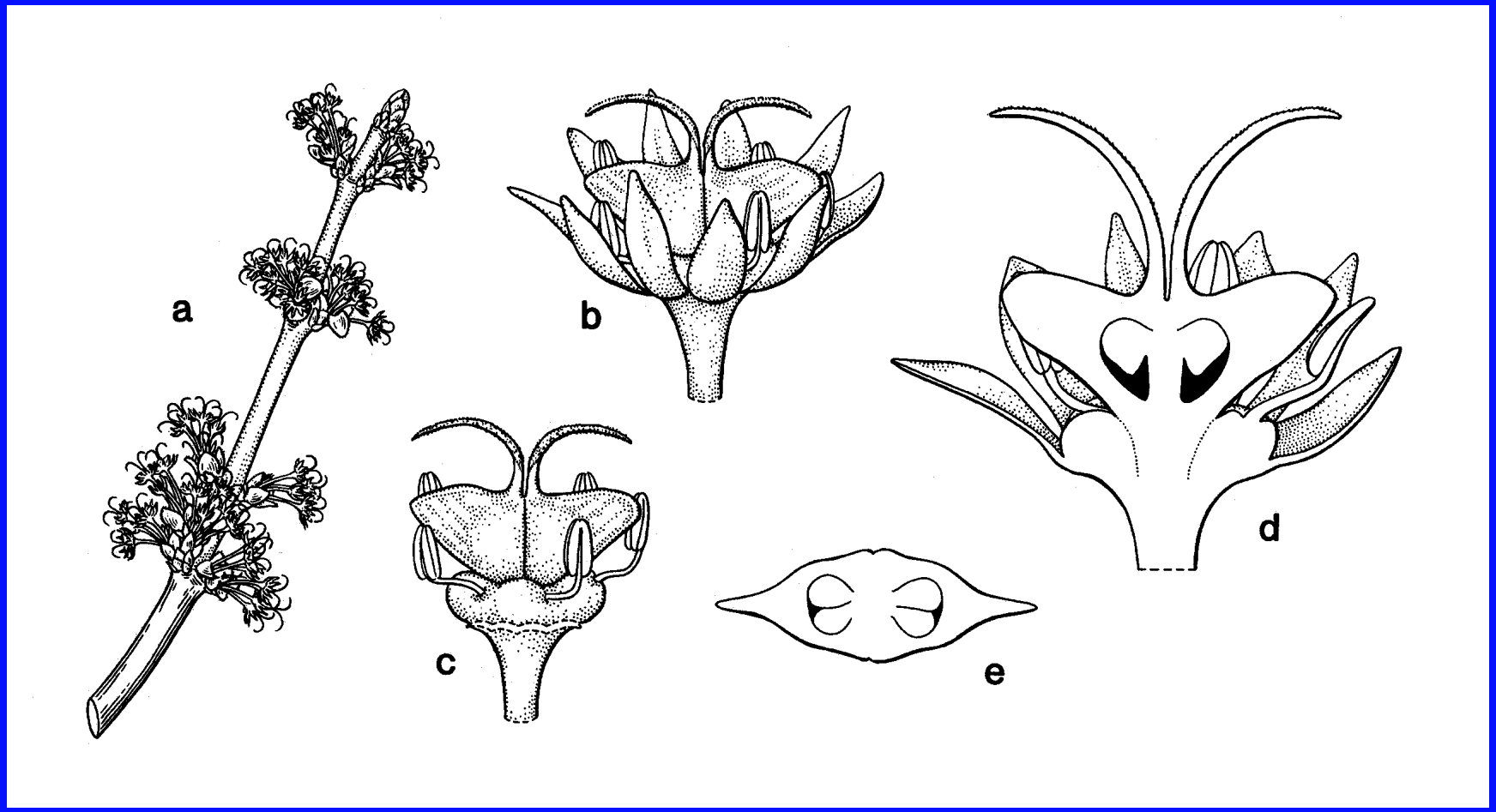
Julius MacLeod (Oostende 1857 - Gent 1919)

Flowers of A. pseudoplatanus & A. platanoides

staminate flower

pistillate flower

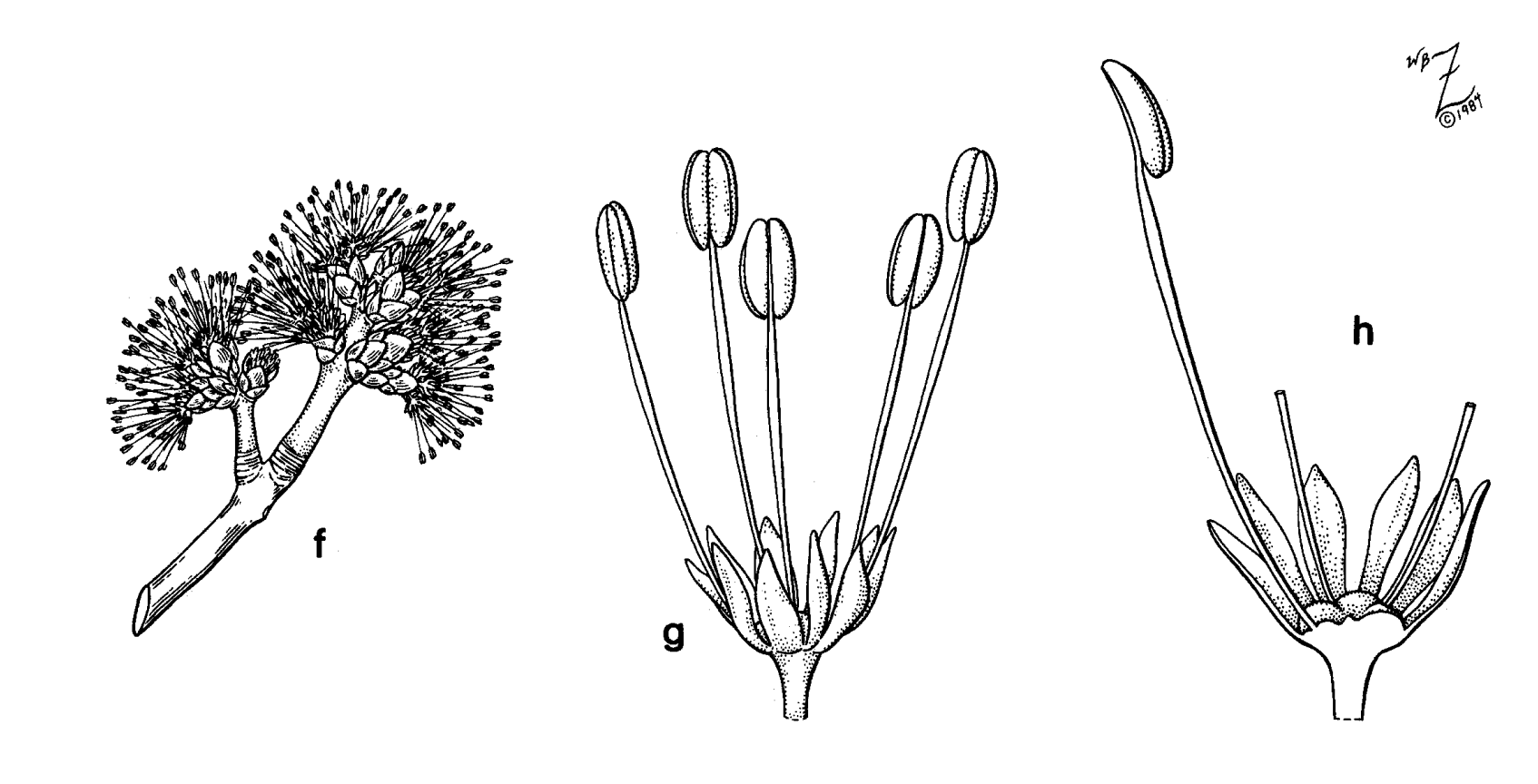
Acer rubrum : dioecy, pistillate flowers



(Zomlefer 1994)

Acer rubrum, pistillate flowers

Acer rubrum : dioecy, staminate flowers



(Zomlefer 1994)

Acer rubrum, staminate flowers

Acer negundo, pistillate & staminate flowers

Acer flowers : some more data

terminal flower : S 5
P 5
A 10
G (2)

lateral flower : S 5
P 5
A 8
G (2)

flowers 6-merous :
Acer macrophyllum
Acer griseum

smallest flower : 4-5 mm diam.
Acer micranthum
(in section *Macrantha* !)

largest flower : > 10 mm diam.
Acer macrophyllum

flowers 4-merous :
Acer carpinifolium
Acer cissifolium
Acer henryi
Acer tetramerum
(= *A. stachyophyllum*)

Winter buds

In a seasonal climate
buds are surrounded and protected by bud scales,
against unfavourable conditions

Number and shape and colour
may be useful in recognizing sections

Scale buds = reduced leaves (cataphylls), but ...

Winter buds : Aesculus parviflora

bud scale = petiole of leaf, petiole base broadly sessile !

Winter buds : Acer rufinerve (sect. Macrantha)

2 pairs of scales

Winter buds : Acer negundo (sect. Negundo)

2-3 pairs of scales

Winter buds :
Acer negundo

(sect. Negundo)

Winter buds : Acer shirasawanum (sect. Palmata)

4 pairs of scales

March

April

Winter buds : Acer buergerianum (sect. Trifida)

7 pairs of scales

Winter buds : Acer macrophyllum (sect. Macrophylla)

c. 7 pairs of scales

Winter buds : Acer opalus (sect. Monspessulana)

c. 10 pairs of scales

Winter buds : Acer maximowiczianum (sect. Grisea)

> 10 pairs of scales

Winter buds : Acer sutchuenense (ser. Mandshurica)

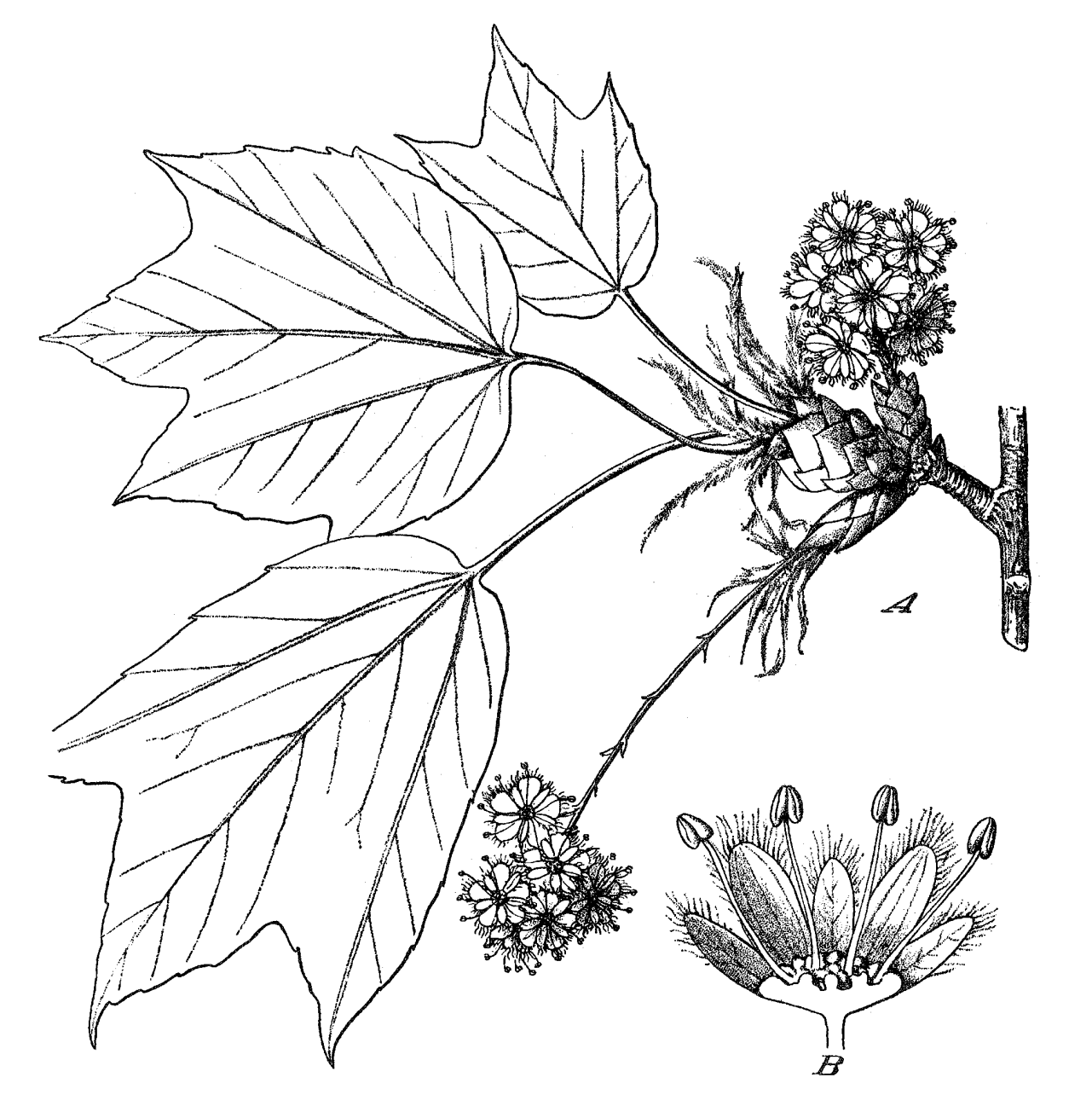
> 10 pairs of scales

(Koen Camelbeke)

Winter buds :

Acer sterculiaceum subsp. franchetii

c . 10 pairs of scales



(Pax 1902)

End of part 1