Lamiaceae to Lythraceae

19

19.1 Lamiaceae: 35-38-39-43-44-45-51-52-56

240 genera and 6700 species. Order Lamiales. Plants without latex and, on a tropical scale, leaves not very often aromatic like those of shrubs and herbs of the Mediterranean region. **Bark** often thin or papyraceous or multilayered (Fig. 19.5). Stems usually **not lenticellate**, quadrangular (Fig. 19.6). Lianas are twining or lean on their support, or climb by means of petiolar bases modified in hooks (Fig. 19.4). **Internodes** quadrangular (Fig. 19.1). **Opposite** leaf arrangement, exceptionally spiral (Fig. 19.2 *Amasonia*, AM). **Stipules** missing. **Leaves** simple, entire or toothed, s.t. cordate (Fig. 19.5 *Tectona*), not coriaceous, compound pinnate in *Peronema* (AS) or palmate (Fig. 19.6) in *Vitex* (Pantrop). **Glands** s.t. at lamina bases (*Aegiphila*, Fig. 19.4 *Gmelina*). **Indument** of simple hairs, surprisingly of stellate hairs in *Callicarpa* and *Tectona*, these genera formerly placed in Verbenaceae [1]. **Inflorescences** in cymes (Fig. 19.3) or in heads (Fig. 19.5), these s.t. surrounded by coloured bracts (Fig. 19.3). **Flowers** often bilabiate, more rarely regular, calyx tubular, persistent in *Clerodendrum* (Fig. 19.3) and *Karomia*. **Ovary** superior. **Fruits** drupes (s.t. blue in *Clerodendrum* Fig. 19.3) enclosing one stone or consisting of 4 druplets.

Fig. 19.1 *Aegiphila integrifolia*, stems quadrangular, Venezuela

R. Keller, *A Field Guide to Tropical Plant Families*,
https://doi.org/10.1007/978-3-031-05942-1_19

Similar families:

VERBENACEAE is a close relative.
ACANTHACEAE, when these have not swollen internodes.
OLEACEAE, but their stems are lenticellate.

Architectural models:

LEEUWENBERG: *Oxera pancheri* (New Caledonia), *Clerodendrum trichotomum*
SCARRONE: *Hyptidendron* sp. (AM-S).
STONE: *Vitex peduncularis, Salvia* spp.
CHAMPAGNAT: *Gmelina arborea* (AS), *Tectona grandis* (AS).

Fig. 19.2 *Amasonia campestris*, French Guiana

Trees (*Gmelina*, *Premna*, *Tectona, Vitex*), numerous **shrubs** (*Hyptis, Vitex*) and even more extratropical **herbs** (*Hyptis*, *Ocimum*, *Plectranthus*, *Amasonia campestris* (Fig. 19.2), the latter atypical with its alternate leaves and trumpet-like flowers).

Lamiaceae grow in savannas, along trails or in dry deciduous forests. *Gmelina arborea* ('gambhar' or 'kashmari') and *Tectona grandis* (teak), native to Burma and Thailand, are intensively cultivated for their wood. Medicinal herbs (*Ocimum gratissimum*, AF). Perfumes (oil of *Pogostemon cablin*, 'patchouli', Malaysia).

! In the system of classification of John Hutchinson [2], Verbenaceae and Lamiaceae have been placed at the top of two divergent lineages, Lignosae for the former and Herbaceae for the latter. More recent APG classifications have gone in the opposite direction, re-parenting, even merging Verbenaceae and Lamiaceae.

! Possible precautions for deterring ants! *Hypenia salzmannii* (Fig. 19.4) has waxy stems which may represent an adaptation to deter ants from reaching the flowers to steal nectar and inadvertently triggering the delicate explosive pollination mechanism on which cross-pollination depends [3].

Fig. 19.3 *Clerodendrum* sp*eciosissimum*, red persistent calyx, fruits green, then turning blue, naturalized in Seram, Indonesia. *Congea tomentosa*, Flowers in small heads surrounded by three bracts, Thailand. *Congea tomentosa*, leaves and stem pubescent, Thailand

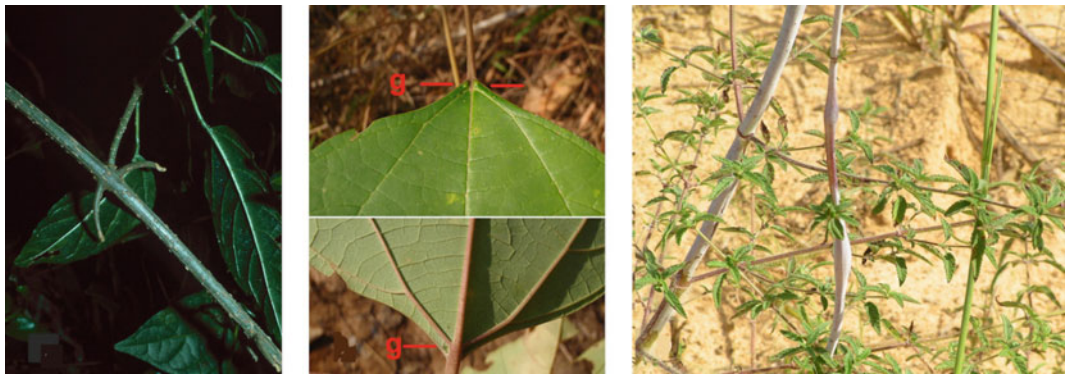

Fig. 19.4 *Clerodendrum* sp., liana bearing hooks, Madagascar. *Gmelina arborea*, glands at base and underside of leaves, their prints visible on the upper side of the leaf, Thailand. *Hypenia salzmannii*, a herb with fistulose wax-covered stems, Venezuela

Fig. 19.5 *Hyptis* sp., inflorescences in heads, Belize. *Tectona grandis*, large cordate leaves, Bali, Indonesia. *Vitex gaumeri*, outer bark and inner bark multilayered, Belize

Fig. 19.6 *Vitex quinata*, trunk with thin bark and small thorns, Sakaerat RC, Thailand. *Vitex* sp., stems quadrangular with spots looking like stipules, Thailand. *Vitex gaumeri*, leaves compound palmate, Belize

19.2 Lauraceae: 12-20-21-23-24-29-30-39-44

56 genera and 2700 species. Order Laurales. Plants without latex and leaves or bark s.t. aromatic (*Cinnamomum*, *Laurus*). Trees without buttresses. Trunks or branches often **lenticellate** (Fig. 19.10). **Rhythmic** growth and branching demonstrated by leaf clusters, scale-leaves, etc. (e.g. *Actinodaphne*, *Aniba*, *Phoebe*) are typical features of the Lauraceae. **Branches** plagiotropic by apposition for some species (Fig. 19.10). Trunks have continuous branching in *Cryptocarya* (Fig. 19.9). **Periderm** of stems remaining greenish for several consecutive GUs. **Stems** somewhat angular at their extremities (Fig. 19.7). Leaf arrangement most often **spiral**, rarely **opposite** (Fig. 19.8) (*Beilschmiedia*, *Cinnamomum*, *Nectandra oppositifolia*), or s.t. two-ranked (Fig. 19.9) (*Cryptocarya*, *Eusideroxylon*). Leaves grouped distally on GUs: *Actinodaphne* (AS), *Aniba* spp. (AM). **Stipules** absent. **Leaves** simple, entire, their underside often blue-green (Fig. 19.9). Young leaf-folding more or less conduplicate (Fig. 19.12), not involute. **Glands** absent, s.t. translucent dots (*Beilschmiedia* spp., AF). **Venation** densely reticulate (Fig. 19.7), camptodromous (Fig. 19.9), with two strong basal lateral veins in *Cinnamomum* (Fig. 19.8). **Inflorescences** cymose (Fig. 19.12), expanded (e.g. *Nectandra*) or contracted (*Litsea*). **Flowers** regular, small with 3–6–9 tepals (Fig. 19.12). **Ovary** superior (inferior in *Hypodaphnis*). **Fruits** 1-seeded-berries, often partially enclosed in a cupula (Fig. 19.11), important for birds.

Similar families:

ANNONACEAE, but conforms to different architectural models.

Architectural models:

MASSART: *Litsea glutinosa* (AS), *Cinnamomum zeylanicum* (AM), *Ocotea guianensis* (AM)

RAUH: *Actinodaphne macrophylla* (AS), *Aniba rosaeodora* (AM), *Persea indica* (AS).

AUBRÉVILLE: *Aniba bracteata* (AM), *Phoebe cuneata* (AS), *Beilschmiedia kunstleri* (AS).

ROUX: *Cryptocarya*, *Eusideroxylon zwageri* (AS).

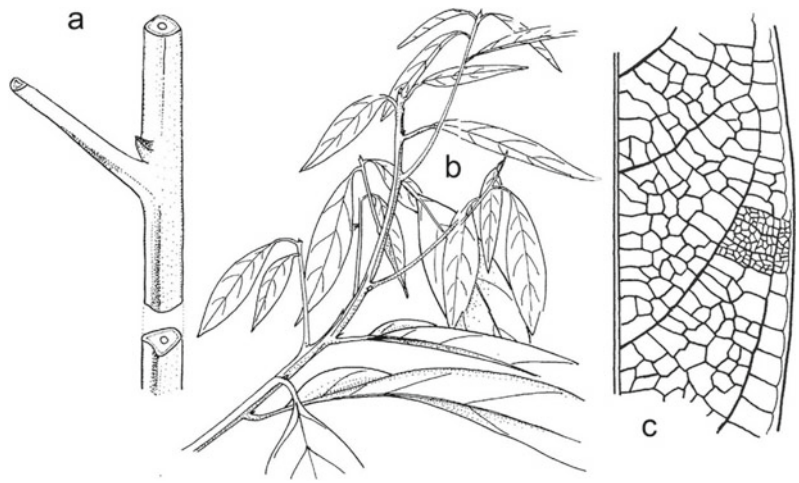

Fig. 19.7 Typical characters: a. internodes angular. b. rhythmic branching. c. venation densely reticulate

Trees (*Actinodaphne*, *Aniba*, *Cinnamomum*, *Dehaasia*, *Litsea*, *Nectandra*, *Ocotea*, *Persea*), some shrubs, and an atypical genus of small twining and hemiparasite lianas (Fig. 19.12 *Cassytha*). Lauraceae are mainly forest trees. Before migration to the boreotropics, this family would have originated in Gondwana [4]. This hypothesis is supported by the bulk of *Ocotea* species in South America. Uses numerous. Timber: wood of *Chlorocardium rodiei* is heavy and very resistant. Fruit trees: avocado tree (*Persea americana*); spices: Cinnamon tree (*Cinnamomum verum)*, mountain pepper or 'kilumu' (*Litsea cubeba)*; essential oils: camphor tree *Cinnamomum camphora*).

! Lauraceae are especially difficult to identify in the absence of flowers or fruits. However, in the course of a short study in the Sierra de Lema (Venezuela), inner bark and rhytidome characteristics show clear differences between the many species encountered there. "Bark World" is not familiar to academic and "herbarian" botanists, a lot of field work remains to be done by the generation of dendrologists to come.

Fig. 19.8 *Cinnamomum bejolghota*, leaves with two strong lateral veins, Thailand

Fig. 19.9 *Cinnamomum camphora,* leaf clusters, leaves supratripliveined, BG LC, France. *Cryptocarya* sp., ROUX's model, Belize. *Cryptocarya* sp., venation camptodromous and underside of leaves blue-green, Moluccas

Fig. 19.10 An unidentified species exhibiting plagiotropy by apposition, Thailand. *Aniba bracteata*, rhythmic growth demonstrated by scale-leaves (c), Guadeloupe. *Litsea cubeba*, lenticellate periderm remaining green for a long period, Thailand

Fig. 19.11 *Litsea* sp., inflorescences glomerulate, Thailand. *Litsea umbellata*, infructescences of grouped berries, Kebun Raya, Java. *Nectandra membranacea*, berries inserted in a cupula, Guadeloupe

Fig. 19.12 *Ocotea lanceolata*, inflorescence cymose, flowers with 6 tepals, Southern Brazil. Conduplicate leaf-folding of an unidentified Lauraceae, Khao Chong, Thailand. *Cassytha* cf. *filiformis*, twining hemiparasite, Seram

19.3 Lecythidaceae: 9-10-13-15-18-25-29

24 genera and 360 species (including Scytopetalaceae). Order Ericales. S.t. trees with impressive buttresses (*Couratari*). Leaves and bark not aromatic. **Bark** fibrous, difficult to tear and detaching in strips (Fig. 19.14). Branches of *Barringtonia* exhibit alternate series of long and short internodes, with leaves somewhat clustered (Fig. 19.15). Leaves **spiral** (*Barringtonia*, *Chydenanthus*, Fig. 19.15 *Careya*, *Gustavia*) or **two-ranked** (Fig. 19.15 *Bertholletia*, *Eschweilera*, *Lecythis*). **Stipules** missing

or minute (*Barringtonia*). **Leaves** simple, entire or toothed (*Cariniana*, teeth s.t. vestigial (Fig. 19.16) in *Eschweilera-Leythis*), lamina large (*Grias*, *Gustavia*), shortly petiolate or cuneate at its base (*Careya*, *Gustavia*). Foliar **glands** in *Napoleonaea* (Fig. 19.18). **Indument** always absent? Young

Fig. 19.13 *Couroupita guianensis*, flowering shoots inserted on trunk, cult

Fig. 19.14 *Eschweilera subglandulosa*, fibrous bark, Venezuela

Similar families:

When leaves are two-ranked: SALICACEAE, but leaves lack a hyaline margin.

Architectural models:

CORNER: *Gustavia longifolia* (AM-S).
LEEUWENBERG: *Barringtonia* sp. (AS), *Gustavia augusta* (AM-S).
KORIBA: *Barringtonia sp*. (Paleo), *Petersianthus macrocarpus* (AF).
RAUH: *Barringtonia asiatica* (MA), *Couroupita guianensis* (AM-S).
MASSART: *Couratari* cf. *stellata* (AM-S), *Napoleonaea vogelii* (AF).
TROLL: *Eschweilera* spp. (AM-S), *Scytopetalum* sp. (AF).

Fig. 19.15 *Barringtonia* sp., rhythmic growth, short (EN c) and long internodes (EN l), Indonesia. *Bertholletia excelsa*, two-ranked leaf arrangement, cult., Malaysia. *Careya* sp*haerica*, scaly bark, leaves spiral, Thailand

leaf-folding involute (Fig. 19.16). **Cauliflory** (*Grias*) or flowering shoots inserted basally on trunk (Fig. 19.13 *Couroupita*). **Flowers** large and showy with 4–6-8 petals and numerous stamens (Fig. 19.14 *Couroupita guianensis*, *Gustavia*). Ovary superior. **Fruits** woody operculate capsules (Fig. 19.17), (*Bertholletia*, *Cariniana*, *Eschweilera*, *Lecythis*), indehiscent capsules (Fig. 19.18 *Gustavia*), *Barringtonia*, huge coriaceous berries (Fig. 19.16 *Couroupita guianensis*, *Gustavia*) or drupes (*Napoleonaea*, *Scytopetalum*). Winged seeds in *Couratari*.

Numerous American **trees**, all evergreen (*Bertholletia*, *Couratari*, *Eschweilera*), small trees in Asia (*Barringtonia*, *Careya*) or in Africa (*Napoleonaea*, *Brazzeia*, *Scytopetalum*), several **shrubs** (*Gustavia*, *Napoleonaea*), no liana and no herbs.

Fig. 19.16 *Couratari guianensis*, buttressed tree, Venezuela. *Couroupita guianensis*, fruiting twigs basally inserted on trunk, cult., FRIM, Malaysia. *Eschweilera* sp., involute folding, vestigial teeth

Fig. 19.17 *Eschweilera* cf. *tenuifolia*, operculate capsules, Venezuela. *Eschweilera* sp., two-ranked leaf arrangement, French Guiana. *Gustavia poeppigiana*, leaves clustered, terminal bud with scale leaves, Venezuela

Fig. 19.18 *Gustavia* cf. *augusta*, Venezuela. Flower with numerous stamens inserted on a disk and coriaceous indehiscent capsules. *Napoleonaea* sp., leaf base glandular, Cameroon

Although modest in species number, Lecythidaceae are an important element in Guianas and Amazonia, but they grow also in paleotropical-Pacific mangroves (*Barringtonia*, *Foetidia*). Timber: *Petersianthus*, *Lecythis*, *Eschweilera*; fruit trees: *Bertholletia excelsa* (Brazil nut, 'Castanheira'), *Lecythis zabucajo* ('coco de mono'). Bark also used to make ties, or even hammock for an overnight camp! Fish poisons (*Chydenanthus*, AS). Ornamental shrubs: *Gustavia augusta* has large showy flowers.

! *Eschweilera*, the genus with the most species in Lecythidaceae, is represented by more trees than any other genus of plants in Amazonia. African genera (*Brazzeia*, *Scytopetalum*) are basal in the family [5].

19.4 Leguminosae—Introduction

780 genera, 19 500 species. Here divided into three groups, recent studies [6] six subfamilies (Caesalpinioideae, Cercidoideae, Detarioideae, Dialioideae, MIM, PAP). Leaf types below (Fig. 19.19), CSL = Caesalpinioid paraclade, MIM = Mimosoid clade, PAP = Papilionoideae.

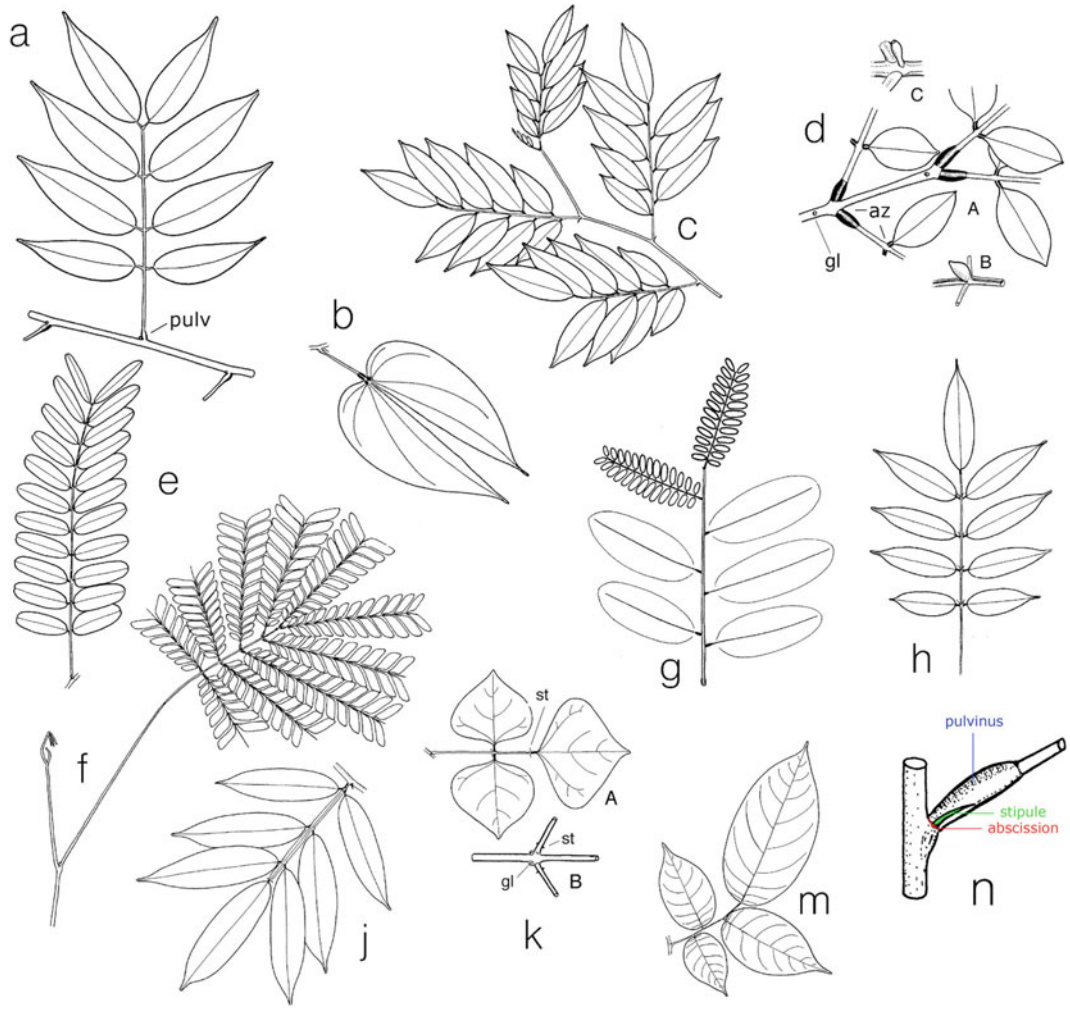

Fig. 19.19 Leaf types

a. paripinnate (CSL-Detarieae, e.g. *Gilbertiodendron*, *Macrolobium*, etc.).
b. bifoliolate (CSL-Cercideae: *Bauhinia,* CSL-Detarieae: *Cynometra, Gilbertiodendron, Peltogyne*).
c. leaflets alternate, one leaflet terminal (Detarieae, e.g. *Crudia*, *Kingiodendron*).
d. pulvinate base of pinnae, A. cupuliformous glands (MIM: *Inga*, *Pithecellobium*), B-C, convex glands (CSL: *Chamaecrista*, *Senna*).
e. paripinnate (CSL-Cassieae: *Cassia*, CSL-Detarieae: *Leonardoxa*, *Macrolobium*).
f. bipinnate, pinnae opposite, leaflets opposite and asymmetrical (MIM-Parkieae: *Pentaclethra*, MIM-Ingeae: *Pithecellobium*).
g. bipinnate, pinnae alternate, leaflets opposite (Dimorphandreae: *Burkea*).
h. imparipinnate leaflets opposite and (st) stipellate (various PAP).
i. imparipinnate, rachis winged (PAP: *Swartzia*).
j. trifoliolate, leaflets stipellate (PAP: *Erythrina*).
k. pinnate, leaflets alternate, one leaflet terminal (PAP-Dalbergieae; CSL-Dialioideae [6]: *Dialium*).
l. signature of the LEGUMINOSAE: stipule, pulvinus and abscission zone.

19.5 Leguminosae–Cercideae–Cassieae–Detarieae–Caesalpinieae: 47-48-55-D

A group encompassing around 170 genera and 2250 species. Caesalpinioideae do not form a natural group (but a paraclade). Plants without latex. Leaves and bark not aromatic. Some large buttressed trees (Fig. 19.29 *Mora* spp.), s.t. trees with fluted trunk (Fig. 19.30 *Vouacapoua americana*). Branches s.t. spiny (*Caesalpinia*, *Mezoneuron*). Serial **buds** in rows in Caesalpinieae (Fig. 19.31). Arrangement of leaves **spiral** (*Cassia*, *Delonix*, *Gleditsia*, *Haematoxylum*) or **two-ranked** (Cassieae: *Cassia*, *Senna*; all the Detarieae: *Brownea*, *Crudia*, *Detarium*, *Gilbertiodendron*, *Hymenaea, Macrolobium*, etc.). **Stipules** present. **Leaves** usually simply compound and paripinnate or bifoliolate (*Cynometra*), imparipinnate in *Dicorynia*. **Leaves** twice compound in many Caesalpinieae (*Caesalpinia*, *Delonix*,

Fig. 19.20 Street trees conforming to CHAMPAGNAT's model, *Delonix regia*, Delta Amacuro, Venezuela

Fig. 19.21 The emblematic 'Saman' of Northern South America, TROLL's model, *Samanea saman*, Upata, Venezuela

Gymnocladus, *Haematoxylon*). **Leaves** can also be bipinnate (*Dimorphandra*, *Pentaclethra*), these s.t. with a terminal pinnae (Fig. 19.25 *Caesalpinia* spp.). **Leaves** rarely simple and bilobate (*Bauhinia* spp.). **Leaflets** usually opposite (Fig. 19.27), rarely alternate (*Crudia* spp., *Gymnocladus*). **Petiole enlarged at its base into a pulvinus**. **Abscission joint between leaflet (or pinnae) and rachis** (see introduction to the family). *Leonardoxa africana* has hollow foliar rachis, inhabited by ants (Fig. 19.28). **Inflorescences** in racemes or spikes of numerous small flowers, terminal (*Caesalpinia*, Fig. 19.27 *Dimorphandra, Senna*) or lateral (Fig. 19.26 *Cassia*, *Senna*), s.t. inserted on thick branches or even on trunks (Fig. 19.25 *Brownea*, *Saraca, Tamarindus*). **Flowers** or inflorescences usually showy (Fig. 19.25) with a more or less bilateral symmetry (Fig. 19.24) and 5–10 stamens (Fig. 19.26). **Stamens** free. **Ovary** superior. **Fruits** dehiscent pods or 'legumes' (Fig. 19.29), indehiscent pods: Fig. 19.30 *Tamarindus*. Pods usually multi-seeded, 1-seeded in *Macrolobium* spp. (Fig. 19.28).

Trees (*Afzelia*, *Bauhinia*, *Brachystegia*, *Copaifera*, *Detarium*, *Daniellia*, *Delonix*, *Guibourtia*, *Intsia*, *Peltogyne*, *Tachigali*, *Tamarindus* and many other genera). Trees are irregularly deciduous, i.e. they frequently keep their leaves at the end of the dry season. **Shrubs** (*Cassia*, *Caesalpinia*), lianas (Fig. 19.24 *Bauhinia*, *Mezoneuron*), very rarely **subshrubs** or **herbs** (Fig. 19.26 *Chamaecrista fasciculata*).

Similar families or subfamilies:

Trees of the Mimosoid clade have as a rule bipinnate leaves and leaflets asymmetrical at their bases.
MELIACEAE are also similar, but their leaves are not stipulate and leaflets have no abscission joint.

'Caesalpinioideae' are abundant in Africa and America, with many beautiful trees, often exploited for cabinetwork, e.g. *Peltogyne* spp. ('Bois violet', 'Zapatero'). Asia has few big trees (*Koompassia excelsa* in Sarawak). Several species are gregarious, *Brachystegia* spp. (South African Miombo woodlands), *Gilbertiodendron* spp. (Equatorial Africa), *Colophospermum mopane* (Fig. 19.22) in Southern Africa, *Copaifera*, *Mora* spp.in the Guianas. Some "precious woods" such *Peltogyne* grow very slowly, but *Schizolobium parahyba* (Fig. 19.23 Amazonian 'guapuruvú') one of the fastest growing trees in the world. In Guianas, *Mora* spp. (Fig. 19.29) have the biggest seeds among 'Dicotyledons'. Fruit trees: *Tamarindus indica* (Fig. 19.30). Lacquers, copals (oleoresins): AM: *Copaifera* (Fig. 19.27), AF: *Daniellia* and *Gossweilerodendron* ('agba'), AS: *Kingiodendron* (AS). Dyes: 'bois de Campeche' or 'pau Brazil': *Haematoxylum campechiana* (Fig. 19.27), colouring agent for histology, *Biancaea* (syn. *Caesalpinia*) *sappan* ('sappannam' of India) provides a red dye for wool and cotton. Numerous ornamental trees, some of the best known are 'flamboyants' because of their orange or red flowers: *Amhertsia nobilis* (Fig. 19.24 Burma), *Delonix regia* (Fig. 19.20) threatened in its native environment (MA), is grown everywhere as a street tree; *Peltophorum pterocarpum* (yellow flamboyant of Indomalesia). Ornamental shrubs and lianas *Caesalpinia* spp., *Bauhinia* spp.

! Monodominance in tropical forests is observed for several Caesalpinioid species, in Africa, *Gilbertiodendron dewevrei* and in the Guianas, *Mora excelsa* [7].

! If one were to attribute a personality to this group, one might say that the Caesalps are big, beautiful and somehow joyful!

Fig. 19.22 Dry forest with *Colophospermum mopane*, Chobe, Botswana

Fig. 19.23 A fast growing post-pioneer tree: *Schizolobium parahyba*, Cockscomb, Belize

A few Caesalpinioids (alternate leaflets in *Dicorynia*), look like *Dalbergia*, *Myrocarpus* (Papilionoideae).

Architectural models:

LEEUWENBERG: *Caesalpinia pulcherrima* (shrub, orig. probably in Asia).

KORIBA: *Burkea africana*, (AF).

SCARRONE: *Caesalpinia yucatanensis* (shrub, AM-C); *Peltophorum dasyrhachis* (tree, AS).

RAUH: *Schizolobium parahyba* (AM).

CHAMPAGNAT: *Delonix regia*, *Senna quinquangulata* (shrub, Guianas).

TROLL:

AM: *Caesalpinia granadillo* and probably all the species of tribe Detarieae, *Hymenaea courbaril*, (AM), *Peltogyne* sp. (AM-S), *Brownea coccinea* (AM-S).

AF: *Baikiaea plurijuga* (African teak), *Gilbertiodendron* spp. (gregarious trees); *Leonardoxa africana*.

AS: *Amherstia nobilis*, *Cassia javanica*, *Tamarindus indica*, *Saraca thaipingensis* (AS).

Fig. 19.24 *Amherstia nobilis*, drooping inflorescence, Kebun Raya, Java. *Bauhinia* sp., liana 'Echelle tortue', French Guiana. *Bauhinia variegata*, Chiang Mai, Thailand

Fig. 19.25 *Brownea* sp., inflorescence in a dense head, Venezuela. *Cenostigma gaumeri*, leaf bipinnate with terminal pinnae, Shipstern, Belize. *Erythrostemon* (syn. *Caesalpinia*) *yucatanensis*, flowers with bilateral symmetry, Belize

Fig. 19.26 *Campsiandra* sp., Orinoco embankments, Venezuela. *Cassia moschata*, lateral flowering, Upata, Venezuela. *Chamaecrista* sp., subshrub, Venezuela

Fig. 19.27 *Copaifera sp*., leaves paripinnate, Venezuela. *Dimorphandra macrostachya*, inflorescence terminal, Aponwao, Venezuela. *Haematoxylum campechianum*, leaves paripinnate, Guadeloupe

Fig. 19.28 *Leonardoxa africana*, sliced internode shows hollow stems inhabited by ants, Campo forest, Cameroon. *Macrolobium acaciifolium*, flat pod enclosing a single seed, Caura, Venezuela

Fig. 19.29 *Mora gongrijpii*, Venezuelan Guayana. Buttressed tree and tree reiterating after a stress (many dead branches). *Saraca thaipingensis*, terminal inflorescences and fruits, BG Singapore

Fig. 19.30 *Senna surattensis*, Chiang Mai, Thailand. *Tamarindus indica*, indehiscent fruits, grown in Belmopan, Belize. *Vouacapoua americana*, fluted trunk, French Guiana

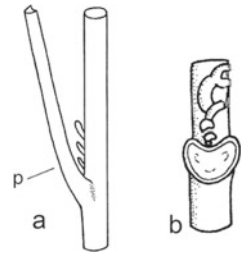

Fig. 19.31 Serial buds in Caesalpinieae. **a**: side view (p: petiole). **b**: ramified upper bud

19.6 Leguminosae–Mimoseae–Acacieae–Ingeae: 20-30-46-57-D

Including here the *Pentaclethra* group, the "MIMO" group encompasses around 85 genera and 3300 species. Plants without latex, s.t. producing gums (*Senegalia*, AF). Leaves and bark not aromatic. **Internodes** angular with petiolar base decurrent on the stem. Inner bark s.t. with a network of fibres (*Inga*). Trunk or branches with **lenticels** transversely elongate (Fig. 19.44), these usually disappearing on old trunks (Fig. 19.45). Branches s.t. **spiny**, the spines of stipular origin (*Acacia* s.l. = *Acacia* + *Senegalia* + *Vachellia*, *Mimosa*, *Piptadenia* spp.). Spines in *Vachellia cornigera* are hollow and inhabited by ants *Pseudomyrmex ferruginea*. Spines of *Dichrostachys* are modified short shoots, Colateral **buds** (i.e. two or three buds are grouped in leaf axils Fig. 19.39). Leaves **spiral** (*Anadenanthera*, *Enterolobium*, *Mimosa*, *Piptadenia, Pentaclethra*, *Pithecellobium*, all AM) or **two-ranked**: *Acacia* s.l. *Inga* (AM), *Dichrostachys* (AF-MA). **Stipules** present. 'Simple leaves' of Australian *Acacia* are in fact **phyllodes** (i.e. petioles modified into a lamina Fig. 19.35). **Leaves** bipinnate (Fig. 19.42), without a terminal pinnae, or leaves simply pinnate (Fig. 19.39 *Inga*). **Leaflets** asymmetric (Fig. 19.42), s.t. very numerous (*Parkia*) or few (Fig. 19.38 *Calpocalyx*, *Zygia*), **sensitive** to touch in most, but not all, *Mimosa* species. **Abscission** joint between leaflet and rachis (see introduction). Rachis or base of petiole glandular (*Cedrelinga*, *Inga*,

Fig. 19.32 *Calliandra calothyrsus*, SCARRONE's model, invasive, Flores, Indonesia

Fig. 19.33 *Falcataria falcata*, TROLL, Flores,

Fig. 19.34 *Enterolobium cyclocarpum*, TROLL's model, Belize

Architectural models:
TROLL (Figs. 19.33 and 19.34): *Acacia*, *Enterolobium*, *Falcataria*, *Samanea*, etc.
SCARRONE (Fig. 19.33): *Calliandra calothyrsus*.
ATTIMS: *Acacia auriculiformis* (and probably other Australian phyllodized *Acacia*).

Fig. 19.41 *Leucaena*, *Pseudosamanea* (AM), *Xylia*, AS, *Acacia* s.l.) or without glands (*Adenanthera* (AS-OC), *Calliandra*, *Mimosa*, AM). Flowering usually lateral (*Inga*, *Mimosa, Piptadenia, Stryphnodendron*). **Inflorescences** in spikes (Fig. 19.38 *Dichrostachys*, *Entada*, Fig. 19.42 *Mimosa*, Fig. 19.43 *Piptadenia*) or glomerulate (*Acacia*, Fig. 19.41 *Mimosa*). **Flowers** small, with a radial symmetry, stamens free, not numerous (5–10) or numerous (Fig. 19.40 *Inga*), s.t. showy, red-coloured. **Ovary** superior. **Fruits** pods, dehiscent or not dehiscent, s.t. flat, coiled (Fig. 19.43) or splitting in 1-seeded parts (*Entada* Fig. 19.39). **Seeds** brown or black, s.t. red (*Adenanthera* Fig. 19.36), covered by a mucilaginous sarcotesta in *Inga* spp.

Trees (AS: *Acacia* s.l., *Albizia*, *Archidendron*, *Xylia*; AM: *Dinizia excelsa*, *Enterolobium*, *Inga*, *Leucaena*, *Piptadenia*), **shrubs** (Fig. 19.32 *Calliandra*), **lianas** (Fig. 19.36 *Acacia*, *Entada*) or **herbs** (Fig. 19.41 *Mimosa*), *Neptunia* being the single aquatic genus.

Fig. 19.35 *Vachellia* (syn. *Acacia*) *cornigera*, hollow spines inhabited by ants, Belize. *Vachellia* (syn. *Acacia*) *hebeclada*, deeply fissured bark, Botswana. *Acacia podalyriifolia*, phyllodized petioles and flat pod, BG LC, France

Fig. 19.36 *Acacia* sp., liana, Madagascar. *Acacia* sp., cross-section of a liana showing reddish phloem poles, Campo forest, Cameroon. *Adenanthera pavoniana*, dehiscent coiled pods with red seeds, INRA, Guadeloupe

Fig. 19.37 *Albizia lebbeck*, indehiscent pods (orig. South East Asia), Yucatan. *Calliandra calothyrsus*, showy stamens with long pink filaments, (orig. AM), Flores, Indonesia. *Calliandra* sp., showy stamens with red filaments, Southern Brazil

Leguminosae-'Mimosoids' are tropical and subtropical in their distribution, many species can support aridity and very few of them grow at high elevations. The presence of a fissured bark (Fig. 19.35) or a chlorophyllous layer (Fig. 19.44) is fequent in savanna trees. *Calliandra* and *Acacia* are typical of disturbed vegetation in dry tropics (e.g. the *Calliandra*-savannas in tropical America). *Leucaena leucocephala* (Fig. 19.40), native to AM-C?, became invasive in all tropics. *Acacia auriculiformis* trees are grown for restoration of secondary forests, their shade enhance native seedlings and saplings. *Samanea saman* ('saman') is a shade tree grown in all townships of South America. Street trees: *Albizia lebbeck* (AS).

Uses: reverse phenology of *Faidherbia albida* makes it the most compatible tree in African agroforestry; firewood (mainly in AF); arabic gum (*Senegalia senegal*); dye extracted from heartwood (*Senegalia catechu*); fruit trees with sweet sarcotesta covering the seeds (e.g. *Inga edulis,* ice cream bean, in Latin America: 'guamo', 'ingá', 'shimbillo'*)*. Several *Senegalia* species produce toxic amine-derivates. Hallucinogenic: seeds of *Anadenanthera peregrina* (AM-S) for preparing 'niopo'.

Acacias are emblematic trees of African savannas, a biome which has greatly extended in the last centuries and reaches the 10th parallel or even the equator in Tanzania. Large scale planting of acacia trees in sub-Saharan Africa is an attempt to reverse this process [8] (Fig. 19.37).

Fig. 19.38 *Calpocalyx* sp., leaves bipinnate each pinnae with 4 pairs of leaflets, Campo forest, Cameroon. *Dichrostachys cinerea*, inflorescence in spikes with anthesis acropetal (orig. MA), BG LC, France. *Entada polystachya*, spikes of flowers in large compound inflorescences, French Guiana

Fig. 19.39 *Entada polystachya*, pods breaking in indehiscent segments, Venezuela. *Inga sapindoides*, winged and glandular rachis, Belize. Collateral buds, small bud (b) near to a large bud (B); **a** *Inga* sp., **b** *Samanea saman*

Fig. 19.40 *Inga* sp., flower with numerous stamens, Southern Brazil. 20. *Inga* cf. vera., striate pod, Cockscomb, Belize. *Leucaena leucocephala*, fascicles of pods, Flores, Indonesia

Fig. 19.41 *Leucaena leucocephala*, glands disposed at rachis nodes. *Lysiloma latisiliquum*, flat pods, Belize. *Mimosa pudica*, 'sensitive plant', Belize

Fig. 19.42 *Mimosa myriadenia*, inflorescences are racemes of spikes, leaves not sensitive to touch! Bochinche, Venezuela. *Parkia* sp., leaf bipinnate, rachis glandular and very numerous leaflets, French Guiana. *Zygia* cf. *collina*, leaf bipinnate with asymmetric leaflets, Venezuela

Fig. 19.43 *Piptadenia leucoxylon*, inflorescence in spikes, Guri, Venezuela. *Pithecellobium* s.l., bipinnate leaves, reddish when young, Venezuela. *Pithecellobium unguis-catis*, coiled pods, Mexico

Fig. 19.44 *Stryphnodendron guianense*, inflorescences in lateral spikes, Bochinche, Venezuela. 32–33. *Vachellia* (syn. *Acacia*) *tortilis*. Lenticels, chlorophyllous layer. Coiled pods, Botswana

Fig. 19.45 *Zygia stevensonii*, leaves bipinnate, each pinnae bearing, 3 (not 4!) leaflets (fm: missing leaflet), Belize. *Xylia xylocarpa*, curious wrinkled rhytidome in an adult tree (lenticels are no more visible), Kerala, India

19.7 Leguminosae–Papilionoideae: 2-6-8-9-46-47-50-53-54-57-D

Around 500 genera and 12,000 species. Plants without latex, s.t. their bark producing a red exudate (*Inocarpus*, *Macropsychanthus*, *Platysepalum*, Fig. 19.57 *Pterocarpus*). Leaves and bark not aromatic. Trunk or branches with **lenticels** transversely elongate. Lianas are twining (*Derris*, *Phaseolus*) or bear prehensile twigs (*Machaerium*). Branches or trunks s.t. spiny (Fig. 19.54 *Erythrina*, *Machaerium* lianas). Axillary **buds** usually solitary, rarely collateral (*Sesbania* spp.) or in vertical row (Fig. 19.58 *Swartzia*). Leaf arrangement usually **spiral** (*Erythrina*, *Mucuna*, *Sophora*, etc.), s.t. **two-ranked** (*Dalbergia*, *Machaerium*), rarely opposite (*Platymiscium*, Fig. 19.59 *Tipuana*). **Stipules** present, rarely absent (Fig. 19.48 *Alexa*). **Leaves** compound 1 × pinnate, usually imparipinnate (Fig. 19.58), less frequently paripinnate (Fig. 19.57), rarely 'unifoliolate' (petiole with abscission joint and distal pulvinus), (*Baphia nitida*, Fig. 19.51 *Dalbergia* spp., *Uraria* spp., *Flemingia strobilifera*). Leaves very rarely truly simple (Fig. 19.59 *Zollernia*, AM). **Leaflets** usually opposite (s.t. more or less alternate, *Dalbergia* (Fig. 19.51), *Diplotropis* spp., *Machaerium*, AM). Leaflets s.t. stipellate (*Erythrina* (Fig. 19.19k), *Platysepalum*, *Swartzia*). **Abscission joint** between leaflet and rachis (see introduction). **Leaves** or leaflets entire, very rarely toothed (*Zollernia*). **Venation** pinnate, rarely tripliveined (*Flemingia*), usually camptodromous, rarely with a fimbrial vein (*Dussia*, Fig. 19.54 *Machaerium*, *Platysepalum*). Foliar glands almost always missing, e.g. *Erythryna* spp.), s.t. translucent dots (*Myrocarpus*, *Myrospermum*, *Myroxylon*, AM). **Flowering** terminal (*Machaerium*, *Ormosia*, *Sophora*) or lateral (*Clitoria*, *Dalbergia*). **Inflorescences** very variable: panicles, racemes, spikes or 1-flowered. **Flowers** with a bilateral symmetry (Figs. 19.49 and 19.50) and 5–10 stamens. Flowers resupinate in many Phaseoleae (e.g. *Macroptilum* Fig. 19.55, *Vigna*). **Stamens** free or fused in a tube. **Fruits** usually pods (Fig. 19.53), samaras *Centrolobium* (Fig. 19.49), *Machaerium* (Fig. 19.55) or something in between, rarely drupes (*Coumarouna*, *Inocarpus*). **Seeds** s.t. orange and black or red and black (Fig. 19.48 *Abrus*, *Sophora* spp.).

Trees (Pantrop: *Dalbergia*, *Erythrina*, *Pterocarpus* (Fig. 19.46) *Sophora*; AM: *Alexa*, *Andira*, *Centrolobium*, *Dipteryx*, *Myroxylon*, *Lonchocarpus*, *Ormosia, Swartzia*; AF: *Cadia*, *Millettia*, *Pericopsis*; AS-AU-OC: *Butea*, *Fordia*, *Inocarpus*, *Intsia*, *Millettia,* etc.); evergreen (e.g. *Alexa*) or deciduous (e.g. *Lonchocarpus* Fig. 19.54). In savannas, bark becomes deeply fissured and a chlorophyllous layer appears between dead bark and inner bark (Fig. 19.56). Shrubs: *Cajanus*, *Dalbergia*, *Indigofera*, *Sesbania*, etc. **Lianas**: *Abrus*, *Dalbergia*, *Dioclea*, *Machaerium*, *Mucuna* (Fig. 19.56), *Phaseolus*. Woody **herbs**: *Arachis*, *Canavalia*, *Crotalaria*, *Desmodium*, *Indigofera*, etc.

Papilionoideae form the most diversified group of the LEGUMINOSAE, they grow in all kinds of environments, extending from equatorial forests to tundra, steppes of Central Asia and Himalayan-Alpine mountain ranges. Uses are very numerous, a multipurpose tree: *Inocarpus fagifer* (Haitian chestnut) for roasted seeds, charcoal, antidote against fish venom and evidently symbolic (red exudate in bark!). Cabinetwood: *Andira inermis*, *Dalbergia* spp., *Centrolobium paraense* ('pau rainha', 'cartán'). Essential oils: *Aniba rosodora* 'pau rosa' (from distilled wood). Oil seeds: *Arachis hypogea* (groundnut). Shade trees for cacao- or coffee-agroforestry (*Erythrina* spp., *Sesbania grandiflora*). Numerous beans native to America: *Cajanus* (Fig. 19.49 'pois cajun', pigeon pea), *Lablab purpureus* (lablab bean), *Phaseolus* ('frijoles', 'feijoas'), *Psophocarpus tetragonolobus* (Goa bean). Sources of perfumes: *Dipteryx odorata* (Fig. 19.53 'Sarrapia'). *Butea monosperma*, the sacred red flowering tree of brahmans provides an astringent gum (Bengal gum). Dyes (indigo, *Indigofera tinctoria*), gums (*Pterocarpus marsupium*). Caution! Seeds of *Abrus precatorius* (Fig. 19.48), when swallowed and the outer coating is damaged, are very toxic (toxalbumin).

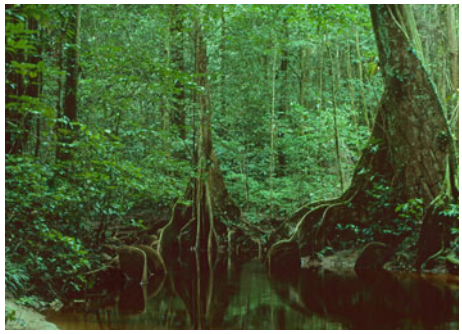

Fig. 19.46 Buttressed trees (*Pterocarpus officinale*) in the sanctuary of Crique Toussaint, French Guiana

Fig. 19.47 A herb conforming to ACOSTA's model, *Indigofera* sp., Flores, Indonesia

Similar groups:

Sesbania similar to some Caesalpinioideae (opposite leaflets in *Cassia-Senna*). Caution with 'unifoliolate' leaves in Papilionoideae. When this trait is not correctly observed, identification at the vegetative stage becomes tricky.

Architectural models:

TROLL: arborescent *Dalbergia*, *Baphia nitida* (AM), *Lonchocarpus* (AM), *Myrocarpus venezuelensis*, *Swartzia arborea*, *Zollernia paraensis* (AM).

ACOSTA (Fig. 19.47): *Indigofera* sp. (AS).

RAUH or SCARRONE: usually when erect branches and a spiral leaf arrangement (*Erythrina*, *Ormosia*, *Sophora*).

Fig. 19.48 *Abrus precatorius*, seeds red and black, Venezuela. *Alexa imperatricis*, no visible stipules! Imataca, Venezuela. *Bowdichia virgilioides*, inflorescence paniculate, terminal, Venezuela

! In the lowland tropics of Africa and America it is almost impossible that a hundred-meter square plot of vegetation does not contain a PAP shrub or tree.

! One may wonder why light tolerant trees valuable for cabinetwork, like *Centrolobium paraense* (orange-coloured wood!), and many other PAP, do not benefit from silvicultural programmes taking advantage of savannized regions or degraded forests instead of logging old-growth forests [9] (Fig. 19.52).

Fig. 19.49 *Cajanus cajan*, cultivated Pigeon pea, Upata, Venezuela. *Canavalia* sp., prostrate herb on a shore, French Guiana. *Centrolobium paraense*, samara with prickly basal part, Venezuela

Fig. 19.50 *Chadsia* sp., flower with bilateral symmetry, Madacascar. *Clitoria ternatea*, shrub, flowers axillary and solitary, Bali, Indonesia. *Crotalaria* cf. *retusa*, spike of flowers, Guadeloupe

Fig. 19.51 *Dalbergia ecastaphyllum*, inflorescences lateral, Southern Brazil. *Dalbergia latifolia*, indehiscent pods, Bali, Indonesia. *Dalbergia latifolia*, leaves with alternate leaflets, Bali, Indonesia

Fig. 19.52 *Dendrolobium* cf. *umbellatum*, fruits lomentaceous, Indonesia. *Uraria oblonga*, subshrub, simple leaves, raceme of flowers, Thailand. *Macropsychanthus* (syn. *Dioclea*) *macrocarpa*, liana producing a red exudate, Fr. Guiana

Fig. 19.53 *Dioclea macrocarpa*, pods and knife 'Opinel' size-12, French Guiana. *Dipteryx odorata*, BG Ciudad Bolivar, Venezuela. *Dussia* sp., leaflets with fimbrial veins, Guadeloupe. *Erythrina folkersii*, floral buds, Belize

Fig. 19.54 *Erythrina subumbrans*, spiny trunk, Thailand. *Lonchocarpus* cf. *tubicalyx*, deciduous flowering tree, BG Ciudad Bolivar, Venezuela. *Machaerium guaremalense*, leaflets alternate, Venezuela. *Machaerium sp*., fimbrial veins (**fv**), Belize

Fig. 19.55 *Machaerium* sp., terminal panicle of samaras, Venezuela. *Machaerium* sp., very rhythmic growth demonstrated by scale-leaves, Venezuela. *Macroptilium atropurpureum*, herb with resupinate flowers, Flores, Indonesia. *Millettia pinnata*, small tree of back-shores, bearing pods, Flores, Indonesia

Fig. 19.56 *Mucuna macrocarpa*, trunciflorous liana, flowers with greenish standard and purple wings, Thailand. *Mucuna urens*, liana with drooping inflorescences, Venezuela. *Philenoptera nelsii*, chlorophyllous layer, Botswana

Fig. 19.57 *Platymiscium trinitatis*, yellow flowers, Venezuela. *Pterocarpus officinale*, red and astringent exudate in bark, French Guiana. *Sesbania punicea*, leaves paripinnate, Venezuela

Fig. 19.58 *Strongylodon macrobotrys*, turquoise blue is an extremely rare colour in angiosperm flowers, (liana native to Philippines) BG LC, France. *Swartzia* sp., serial buds, Venezuela. *Swartzia* sp., leaves imparipinnate, S-Brazil

Fig. 19.59 *Tipuana tipu*, stem with leaves opposite pinnate mimicking a bipinnate leaf (b: axillary bud), BG Villa Thuret, Antibes. *Zollernia paraensis*, leaves simple with spiny teeth, Caura Basin, Venezuela. Camptodromous venation of an unidentified Papilionoideae, Sumatra

19.8 Linaceae–Hugonioideae (H) + Ixonanthaceae: 13-18-29-30-54 (I)

Two taxa encompassing 12 genera and 50 species (more 230 species in extratropical *Linum*). Order Malpighiales. **Trees** or **shrubs** (**I**: *Ixonanthes*, AS; **H**: *Hebepetalum*, *Ochthocosmus*, *Roucheria*, AM), **lianas** bearing opposite hooks (**H**: Fig. 19.60 *Hugonia*, Paleo) or alternate hooks (**H**: *Indorouchera*, Andaman isles, AS-SE). Rhythmic growth and branching. Leaves usually **spiral** (**H**: *Hugonia*, Paleo; **I**: *Ochthocosmus*, AM) or **two-ranked** (**I**: *Phyllocosmus*, AF). **Stipules** present or missing. **Leaves** shortly petiolate or subsessile, entire or crenulate. Young **leaf-folding** involute (Fig. 19.60) (**b**). Venation camptodromous (Fig. 19.60) (**c**) or brochidodromous (**d**), main vein raised at upper side of the lamina. **Indument** none. **Inflorescences** terminal, cymose (Fig. 19.61a) or lateral, racemose (Fig. 19.61b, c). **Flowers** usually regular and 5-merous. **Fruits** capsules (Ixonanthaceae) or drupes (Hugonioideae).

Adding to this group Erythroxylaceae, Irvingiaceae and Humiriaceae forms a set equivalent to the Cronquist's Linales [10], in which the members shares at least three traits in common: strong rhythmic growth, leaves glabrous and, at the beginning of leaf development, leaves **involute** in bud. Consequently, confusion among these five taxa is to be expected. In addition, in America, possible confusion of *Roucheria* with other 'rhythmic taxa' such as *Ouratea* (Ochnaceae), which also have numerous parallel secondary veins, but the latter bear intrapetiolar stipules (Fig. 19.62).

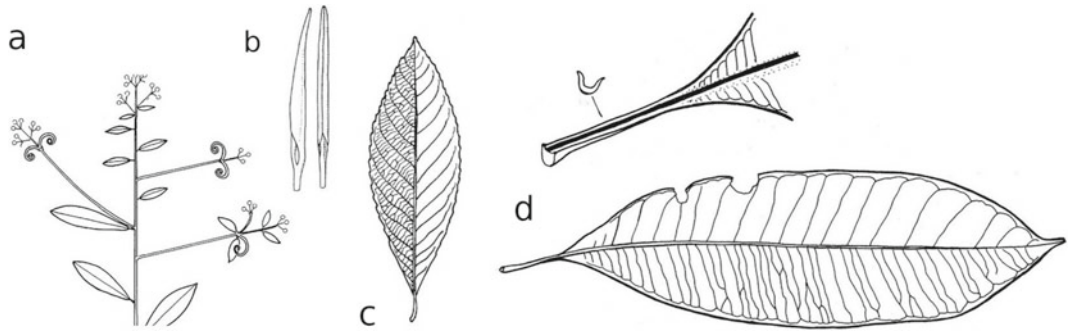

Fig. 19.60 *Hugonia*, **a**: hooks axillate by opposite prophylls, **b**: involute young leaves, **c**: venation camptodromous and scalariform. **d**. *Roucheria humiriifolia*, leaf entire, venation brochidodromous with numerous secondary veins, detail: canaliculate petiole, French Guiana

Fig. 19.61 **a** *Ixonanthes icosandra*, cymose infructescence. **b** *Ochthocosmus roraimae*, crenulate leaves, lateral racemes of tiny flowers, Venezuela. **c** *Phyllocosmus africanus*, entire leaf, fascicle of spikes of flowers, West Africa. All drawings according to herbarium specimens, CBG H

Ixonanthes icosandra were used for tanning fishing nets in Malaysia. Hugonioideae might be considered at the family rank (Hugoniaceae). Extratropical *Linum*, the only genus in Linoideae being very exotic in this group.

19.9 Loganiaceae + Gelsemiaceae: 32-33-35-38-56

16 genera and 400 species. Order Gentianales. Plants without latex, not aromatic. The majority of the species are *Strychnos*, and most of these are **lianas** climbing by means of short shoots modified into hooks (Fig. 19.65). Peculiar scattered disposition of **phloem** (or other tissue) in xylem (Fig. 19.66), s.t. sclerenchymatous cells coming along with phloem (Fig. 19.64 *Strychnos* spp.). **Opposite** leaf arrangement, s.t nodes enlarged (Fig. 19.67 *Geniostoma*). **Stipules** s.t. present (*Labordia*, *Mostuea*, *Neuburgia*), interpetiolar ridge (Fig. 19.67 *Geniostoma*, *Strychnos*). Leaves simple, entire. Glands missing. Leaf venation of *Strychnos* is typical: two strong lateral veins run along the lamina (Fig. 19.65). Plant glabrous except *Antonia ovata*. **Flowers** with 4–5 free or fused petals (Fig. 19.63

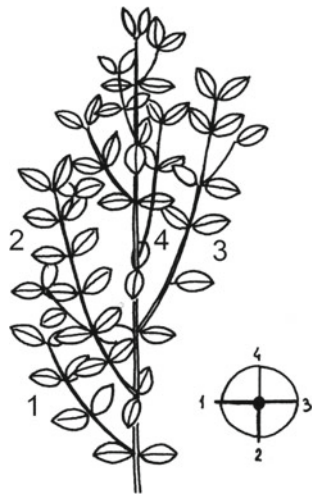

Fig. 19.62 *Antonia ovata*, helicoidal anisoclady, each lateral branch are inserted in a different quadrant, Fr. Guiana

Similar families:

GENTIANACEAE and RUBIACEAE are two taxonomically very close families. Helicoidal anisoclady (Fig. 19.62) exists also in RUBIACEAE.

Architectural models:

LEEUWENBERG (Fig. 19.63): *Logania imbricata* (NC), *Spigelia anthelmia* (AM, nat. Paleotropics).

MASSART: *Strychnos axillaris* (AS).

MANGENOT: *Strychnos* spp.

SCARRONE (Fig. 19.66): *Neuburgia moluccana* (AS).

STONE (Fig. 19.62): *Antonia ovata* (Guianas), *Bonyunia minor* (N AM-S).

CHAMPAGNAT: *Strychnos madagascariensis*, *Gelsemium sempervirens* (AM-N).

TROLL: probably absent.

Mostuea), corolla contortate (Fig. 19.67). **Ovary** superior. **Fruits** capsules (*Antonia*, Fig. 19.67 *Geniostoma*), berries (Fig. 19.64 *Strychnos*) or drupes (*Neuburgia*).

Small **trees** (*Neuburgia*), **shrubs** (*Antonia*, *Geniostoma*, *Labordia*, *Logania*, *Strychnos*), woody lianas (*Strychnos*) and **herbs** (*Mitracasme, Mitreola*, *Schizacme,* Fig. 19.63 *Spigelia*).

Fig. 19.63 *Logania imbricata*, LEEUWENBERG's model. *Mostuea* sp.(Gelsemiaceae), corolla of fused petals, stipular ruff, Madagascar. *Spigelia anthelmia*, inflorescence in spikes, naturalized, Bali

Fig. 19.64 *Strychnos congolana*, young plant, two cotyledons, first axis becoming plagiotropic then erect trunk with rhythmic growth and branching. *Strychnos fendleri*, salmon pink inner bark and sclerenchymatous inclusions of phloem in wood, Venezuela. *Strychnos madagascariensis*, shrub bearing coriaceous berries, Madagascar

Fig. 19.65 *Strychnos nux-blanda*, coriaceous berry and seeds, Thailand. *Strychnos peckii*, hook inserted in the axil of a fallen scale-leaf (c), Belize. *Strychnos* sp., typical venation, Thailand

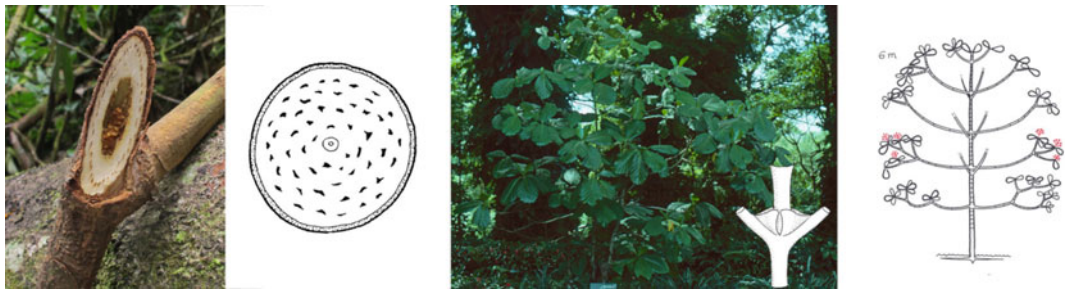

Fig. 19.66 *Strychnos peckii,* Belize. Liana cross-section showing phloem poles arranged in a ring inside wood. *Strychnos* sp., phloem scattered in wood (other disposition). *Neuburgia moluccana*, Indonesia, leaves clustered, stipules adnate to the petiole, SCARRONE's model

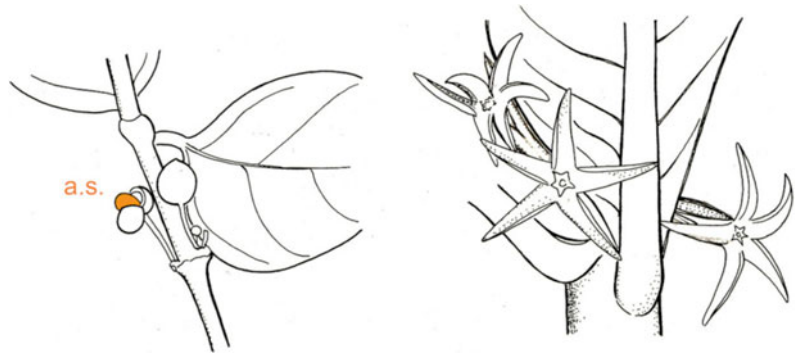

Fig. 19.67 *Geniostoma rupestre*, nodes enlarged, arillate seed (a.s.), Philippines. *Labordia waiolani*, contortate corollas, Hawaii

Essentially tropical. *Strychnos* extends from AF to AU and Oceania. Strychnine, a poison used in the past to kill rats, is extracted from seeds of *Strychnos nux-vomica*. This alkaloid was used in the preparation of dart poisons (curare), named 'ourari' in Guyana (*Strychnos toxifera*), 'belai hitam' in Malaya (*S. scotechinii*), [11]. Another toxic plant: *Spigelia anthelmia* ('la Brinvilliers'), in remembrance of a criminal case. Ground seeds of *Strychnos potatorum* are used in India for clarifying muddy water.

19.10 Lythraceae: 33-37-38-41

28 genera and 500 species. Order Myrtales. Plants without latex, leaves and bark not aromatic. **Bark** sloughing off in scales (Fig. 19.68, Fig. 19.72 *Lagerstroemia*) or fibrous strips. Trunks of several species bear pointed stumps (which are bases of old branches) (Fig. 19.71). **Internodes** angular, s.t. alternatively twisted in horizontal stems (Fig. 19.70 *Lagerstroemia*, *Lafoensia*). **Opposite** leaf arrangement, the leaves of the same pair s.t. staggered (Fig. 19.69). **Stipules** s.t. present but minute (Fig. 19.72 *Lagerstroemia*), absence of interpetiolar ridge. **Leaves** simple, entire. **Glands** missing, except in *Sonneratia* (Fig. 19.69) (**b**). **Venation** usually campto (Fig. 19.72 *Lagerstroemia*, *Lafoensia*). Plants glabrous or pubescent. **Flowers** with a radial symmetry, 4–6-8 free petals (Fig. 19.70) and numerous stamens in Sonneratioideae (Fig. 19.73), but bliabiate-tubular with stamens twice the numbers of petals in Lythroideae (Fig. 19.71 *Cuphea*). **Fruits** capsules.

Trees (AS: *Duabanga*, *Lagerstroemia*, **mangrove** trees with pneumatophores (Fig. 19.73): *Sonneratia*), **shrubs** (AM: *Lafoensia*) and **herbs** (AM: *Cuphea*), a few **aquatics** (*Lythrum portula*, *Rotala* spp., *Trapa natans*). Trees of this family are typical of tropical dry deciduous forests, mainly in Asia (*Lagerstroemia*), less often in America (*Lafoensia pacari* in Southern Brazil and Paraguay). Timber (AS: *Duabanga*, *Lagerstroemia*); fruit trees (pomegranate: *Punica granatum*, but extratropical); source of dye ('héné': *Lawsonia inermis*, Paleo); ornamentals as street trees (*Lagerstroemia* spp.) or small herbs (*Cuphea* spp.). *Trapa natans*, the European water-chestnut, is cultivated in Vietnam.

Similar families:
COMBRETACEAE and MYRTACEAE, two other families belonging to the order Myrtales. Combretaceae are usually pubescent and glandular and leaves of many Myrtaceae have translucent dots.

Architectural models:
MASSART (Fig. 19.69a): *Duabanga grandiflora* (AS)
ATTIMS: *Sonneratia caseolaris* (mangrove, AS-OC).
TROLL: *Lagerstroemia macrocarpa* (AS).

Fig. 19.68 *Lagerstroemia duperreana*, patchy sloughing off of the rhytidome, Thailand

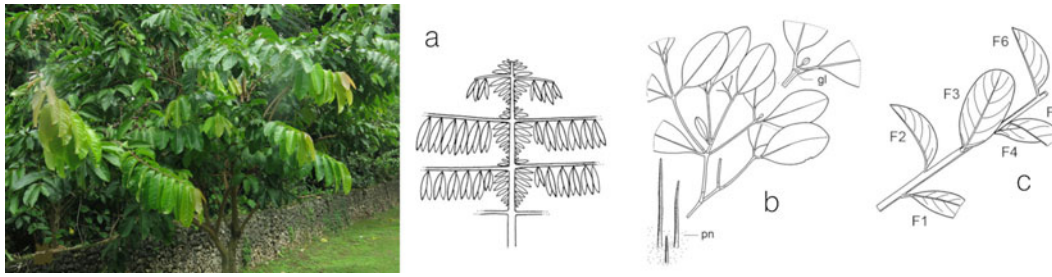

Fig. 19.69 *Lagerstroemia* sp., TROLL's model, Bali, Indonesia. **a**: *Duabanga grandiflora*, MASSART's model, branch leaves are larger than trunk leaves; **b**: *Sonneratia* sp., glands (gl) distally disposed on the internode; **c**: *Lagerstroemia* sp., subopposite staggered leaf arrangement (F1-F2, F3-F4, F5-F6)

Fig. 19.70 *Duabanga grandiflora*. Camptodromous venation, Thailand. Angular-winged internodes, these alternately twisted, Seram, Indonesia. Coriaceous flower buds, Thailand

Fig. 19.71 *Cuphea llavea*, tubular calyx and bilabiate corolla, cult. *Lagerstroemia* sp., thorny trunk, scaly bark, Thailand. *Lagerstroemia duppereana*, pubescent stem apex, Thailand

Fig. 19.72 *Lagerstroemia* sp., bark sloughing off in plates, trunk with pointed stumps, Thailand. *Lagerstroemia* sp., leaves shortly petiolate, vestigial prints of stipules, Bali. *Lagerstroemia* sp., angular internodes and short petioles, Thailand

Fig. 19.73 *Sonneratia* sp., flower with numerous stamens, Flores, Indonesia. *Sonneratia* sp., flower and its 6 sepals (petals have been removed), Flores, Indonesia. *Sonneratia* sp., pneumatophores, mangrove, Bali

! Botanists can be classified into "splitters" and "lumpers", splitting is nowadays a mainstream tendency in taxonomy. Lythraceae represents an example of a lumping process in APG classifications where Lythraceae s.str., Punicaceae, Sonneratiaceae and Trapaceae were united in a single family. As a consequence, Lythraceae becomes a well-balanced assembly of trees, shrubs and herbs.

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