

INTRODUCTION

After the publication of *Seed plants of southern Africa: families and genera* (Leistner 2000) the Executive of SABONET expressed the wish to have the scope of this work extended to cover all 10 countries in which the organisation is active. In response to that wish the present project was undertaken. As indicated on the title page, it is a supplement to Leistner (2000) and it will generally be necessary to consult the two works together. During the compilation it was apparent how many plant groups are still poorly known. The present work should therefore be considered no more than a small tentative step towards that grand goal—a *Flora africana*.

Area covered

The area covered is referred to as *southern tropical Africa* (abbreviated: *sthn trop. Afr.*). Five countries are included: Angola, Zambia, Zimbabwe, Malawi, and Mozambique which lie in a broad belt from the Atlantic to the Indian Oceans to the north of the five countries in the southernmost part of Africa dealt with in Leistner (2000), namely Namibia, Botswana, South Africa, Swaziland and Lesotho.

Arrangement and circumscription of families and genera

As in Leistner (2000) the families are alphabetically arranged within the three groups: (1) **Gymnosperms** or non-angiosperm seed plants (pp. 26–29), (2) **Dicotyledons** or Magnoliopsida (pp. 30–374) and (3) **Monocotyledons** or Liliopsida (375–458). The Magnoliids, Ceratophyllales and the Basal families Cabombaceae and Nymphaeaceae are again treated within the alphabetical system of the dicotyledons.

Relationships between families are shown in the simplified cladograms taken from Angiosperm Phylogeny Group (APG II) (2003), on p. 3. The position of every family is also given in brackets underneath the family name in the text treatment: (1) in the first line according to the system of Cronquist (1988) as given in Mabberley (1997), which, in practice at least, has not yet quite replaced (2) the system of APG II, which is shown in the second line.

Compilation and main sources

This work was compiled almost exclusively from literature consulted up to October 2003. Information was freely copied, often verbatim, from the cited references. The main sources of information were Lebrun & Stork (1991–1997 and 2003), an unpublished checklist of families and genera of the region compiled by Dr Neil Brummitt and placed at my disposal by the author with kind permission of the Director of the Royal Botanic Gardens, Kew, *Kew Records* and the following Floras: *Flora zambesiaca*, *Conspectus florae angolensis*, *Flora de Moçambique*, *Flora of tropical east Africa*, *Flora of west tropical Africa*, *Flore d'Afrique centrale*, *Flore du Gabon* and *Flore du Cameroun*. The most frequently consulted journals were *Kew Bulletin* and *Bulletin du Jardin Botanique National de Belgique*.

Descriptions and notes

Descriptions of families and genera dealt with in Leistner (2000) are generally not repeated in this book. At the beginning of these families is a reference to that publication starting with the name of the compiler of the family account and giving the page on which it starts. Important family characters recorded for southern tropical Africa but not for southern Africa, are noted. The aim in compiling both family and genus descriptions was to reflect characters found in local representatives, rather than those found outside the region. Distribution and size of families and genera on a worldwide basis are given only for taxa not dealt with in Leistner (2000). Occurrence within the region is expressed in terms of the five countries covered. The presence of a genus in *southern Africa* is also generally recorded even though this fact is immediately visible by the absence of a description in the text. A genus recorded for both southern tropical and southern Africa with a single representative in *southern tropical Africa* is not necessarily represented in *southern Africa* by the same species. The number of genera in the region and the number of species by which they are represented is given.

Exotics

Full treatment is again given to genera represented by one or more exotic species considered to be growing spontaneously in natural vegetation and therefore likely to be taken as indigenous. Information on this issue is very sparse and there are likely to be many more naturalised exotics than listed here. Entirely exotic families, genera, and species are marked with an asterisk.

Synonyms

Synonyms cited are mainly those found in commonly used literature. Generic synonyms do not necessarily embrace the entire content of the current genus.

Identification of genera

Genera of families represented by only one genus will obviously key out in the key to families. In families with more than one genus there is either a key to genera, or notes describing how the genus can be keyed out using the key in Leistner (2000). In families in which all genera are also dealt with in Leistner (2000), no identification aids are given.

Number of taxa represented

The flora of the five countries, as reflected here, comprises 228 families, 2,032 genera, and 11,637 species. These figures are fairly similar to those for the five countries of *southern Africa* with regard to families and genera, but strikingly different with regard to species: 237 families, 2,242 genera, 20,677 species (Germishuizen & Meyer 2003). The vast difference in species numbers can be ascribed mainly to two factors: (1) the species-rich Cape Flora in *southern Africa*, and (2) the less complete knowledge of the flora of parts of the northern countries. The 18 largest genera in the Cape Flora are represented by 2,687 species (Goldblatt & Manning 2000). Of the same genera five are absent from *southern tropical Africa* and the rest comprise a mere 221 species. The 18 largest genera in *southern tropical Africa* contain a total of 1,993 species. The same genera are all well represented in *southern Africa* by a total of 1,444 species. Genera in *southern tropical Africa* are mostly smaller than in the region to the south, with an average of 5.7 species to the genus compared to 9.2.

Glossary

A glossary is given on p. 459.

Acknowledgements

My sincere thanks go to the Executive of SABONET, specifically Prof. Gideon Smith, and Mr Chris Willis and Dr Stefan Siebert for entrusting me with the task of compiling this work. It kept this pensioner out of mischief and out of the kitchen sink. The Chief Executive of the South African National Biodiversity Institute, Prof. Brian Huntley, is thanked for facilitating the contact with the Directorate of the Royal Botanic Gardens, Kew, which resulted in the assistance by researchers of that institution: Dr R.K. Brummitt, Dr Neil Brummitt, Dr Alan Paton and Dr Gerald Pope. The Publication Section of the SANBI again rendered sterling support; my particular thanks go to Emsie du Plessis, who helped me take the first faltering steps towards computer literacy; Sarie Brink and Daleen Maree provided technical support. Clare Archer of the SANBI (National Herbarium, Pretoria) gave me access to her draft checklist of *Zambian Cyperaceae*. Mariette, Elke, and Ninette provided the required congenial atmosphere at home base.

Literature

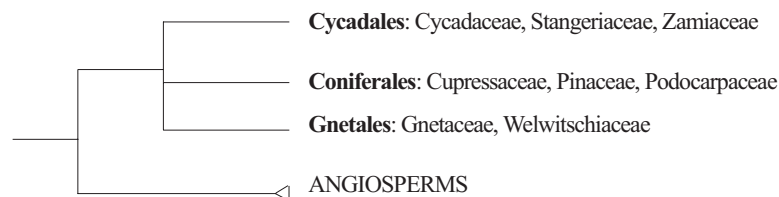
The literature consulted in the compilation of families is given at the end of each family treatment. The page on which a family is given in Leistner (2000) and the name of the compiler is shown at the beginning of all relevant families, but the work is not routinely listed under the References of the family. The work by Lebrun & Stork (1991–1997), which was very frequently consulted, is also not routinely cited. Literature referred to above, as well as much-used sources of a general nature, include the following:

- ANGIOSPERM PHYLOGENY GROUP (2003). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. *Botanical Journal of the Linnean Society* 141: 399–436.
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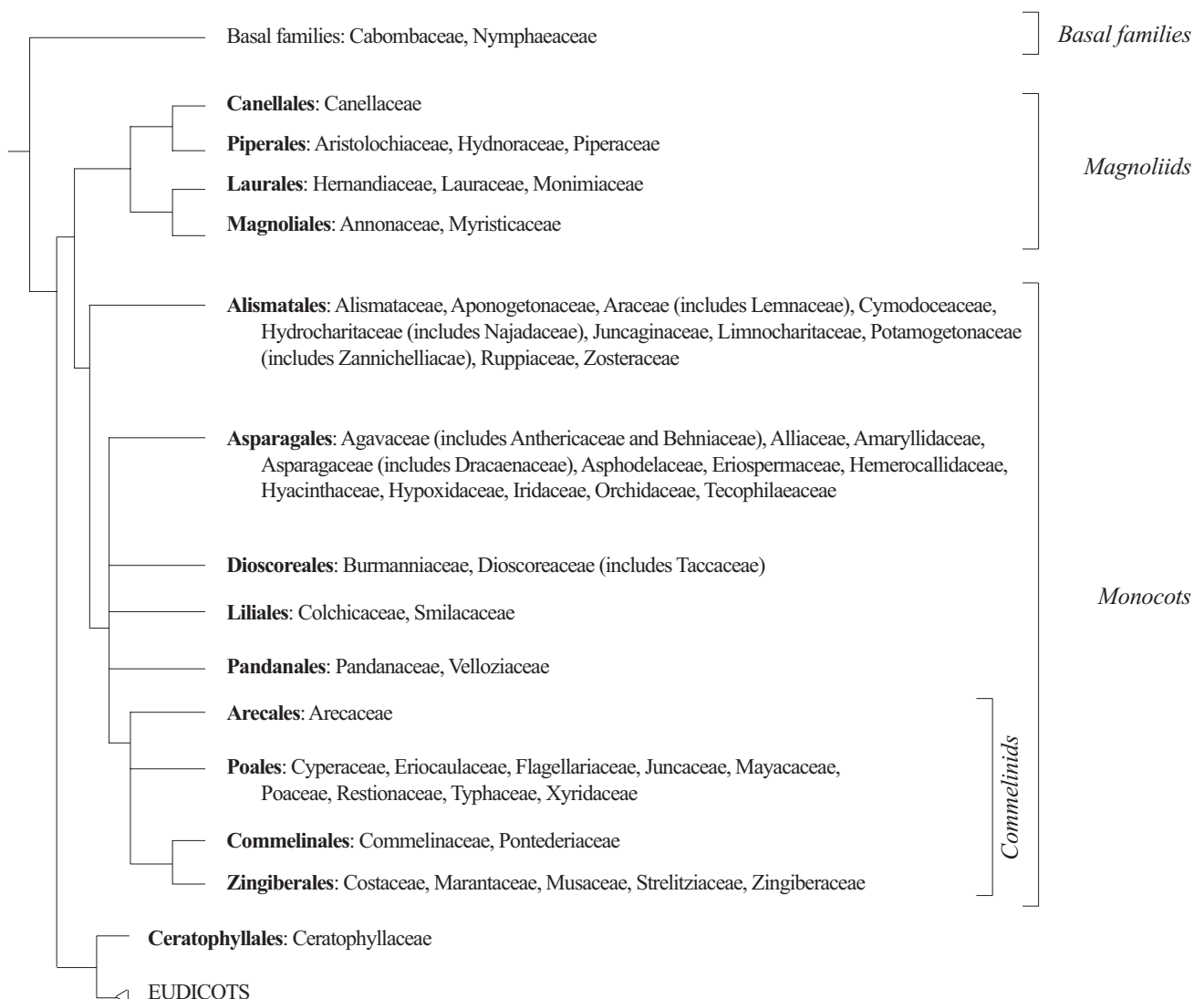
CLASSIFICATION OF FAMILIES

In this work, families are arranged alphabetically under (1) gymnosperms, (2) dicotyledons, and (3) monocotyledons. The relationships between families are therefore scarcely reflected by their position. A knowledge of the phylogenetic situation of a family, however, is essential if it is to be seen in a wider context. In the simplified cladograms below, families are arranged according to the system proposed by the Angiosperm Phylogeny Group II (2002, *Botanical Journal of the Linnean Society* 141: 399–436). Only families recorded from southern tropical Africa are included. The order to which each family is assigned is also given in the Index (p.479). Unplaced families are listed after the asterids (p.4). Exotic families are not marked with an asterisk.

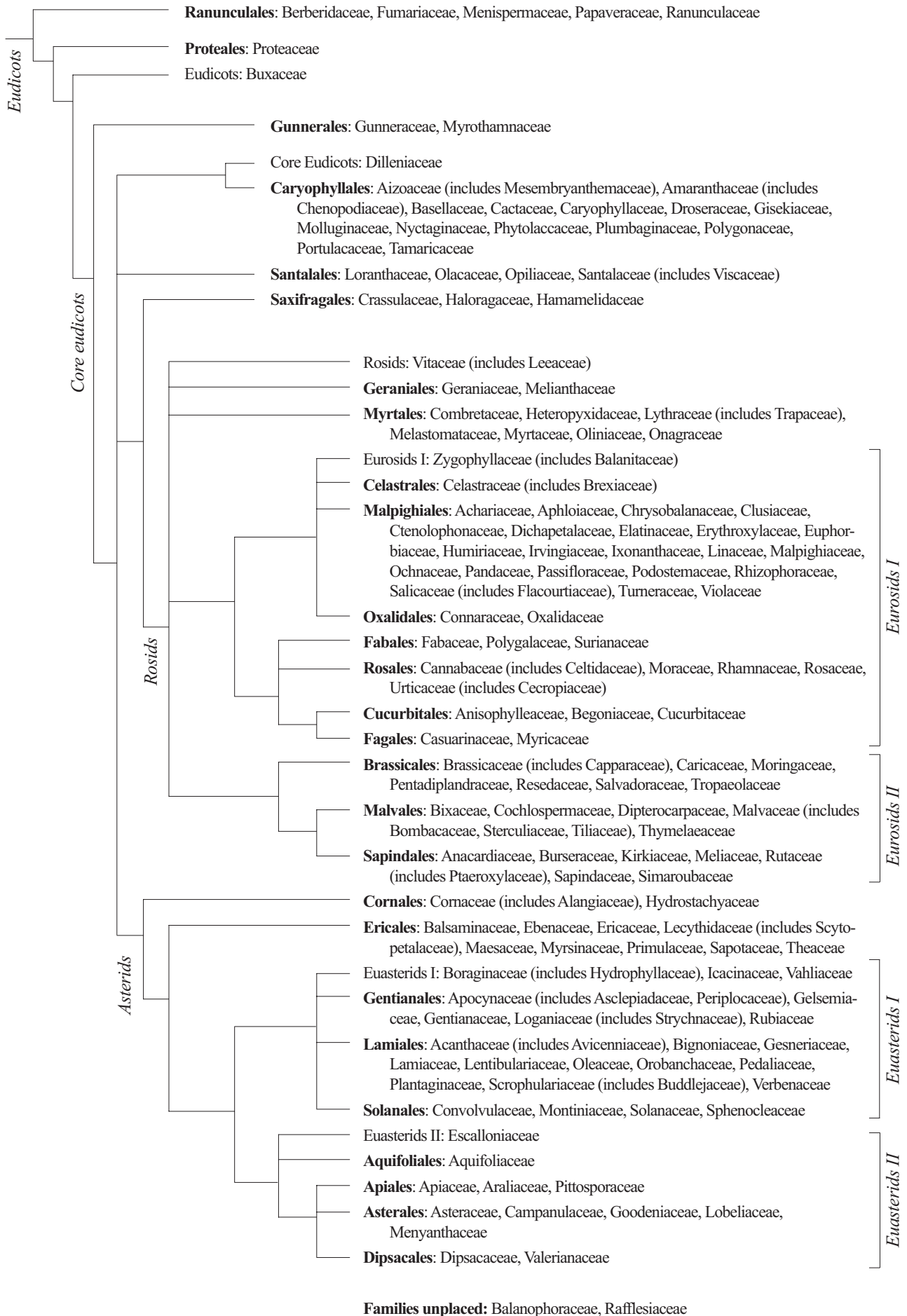
GYMNOSPERMS



ANGIOSPERMS



EUDICOTS



IDENTIFICATION OF FAMILIES

This supplement, used in conjunction with *Seedplants of southern Africa: families and genera* (Leistner 2000), aims to help the reader identify seed plants from *southern tropical Africa* down to genus level and, in the case of genera represented only by one species, down to species level. The key to families, given later in this section, covers all families dealt with. Descriptions of families and genera given in Leistner (2000) are not repeated and only important family characters not occurring in plants from southern Africa are listed. Keys to genera are provided or, in some families, with only a few genera additional to those in the original work, notes are provided to indicate where the genus would run in the key in Leistner (2000).

Characteristics found only in a limited number of families

Certain distinctive attributes encountered in some or all members of a limited number of families may prove helpful when identifying plants (G—gymnosperms; M—monocotyledons; all others—dicotyledons):

Water plants, free-floating or with floating leaves:

Alismataceae (M), Aponogetonaceae (M), Araceae (including Lemnaceae) (M), Cabombaceae, Crassulaceae, Droseraceae, Hydrocharitaceae (M), Lentibulariaceae, Limnocharitaceae (M), Lythraceae, Mayacaceae (M), Menyanthaceae, Nymphaeaceae, Onagraceae, Podostemaceae, Pontederiaceae (M), Potamogetonaceae (M), Scrophulariaceae, Trapaceae.

Water plants, with submerged stems and leaves:

Alismataceae (M), Aponogetonaceae (M), Ceratophyllaceae, Cymodoceaceae (M), Droseraceae, Elatinaceae, Haloragaceae, Hydrocharitaceae (M), Hydrostachyaceae, Lentibulariaceae, Limnocharitaceae (M), Lythraceae, Mayacaceae (M), Najadaceae (M), Onagraceae, Podostemaceae, Potamogetonaceae (M), Ranunculaceae, Ruppiaceae (M), Scrophulariaceae, Zannichelliaceae (M), Zosteraceae (M).

Parasitic plants:

(1) Without chlorophyll: Balanophoraceae, Convolvulaceae, Hydnoraceae, Lauraceae, Rafflesiaceae, Scrophulariaceae (including Orobanchaceae); (2) growing on aerial parts of trees and shrubs: Loranthaceae, Viscaceae.

Grasses and grass-like plants:

Cyperaceae (M), Juncaceae (M), Poaceae (M), Restionaceae (M), Typhaceae (M).

Succulent plants:

*Agavaceae (M), Aizoaceae, Amaranthaceae, Amaryllidaceae (M), Apocynaceae, Asphodelaceae (M), Asteraceae, Balsaminaceae, Begoniaceae, Boraginaceae (*Heliotropium curassavicum*), Cactaceae, Chenopodiaceae, Crassulaceae, Dracaenaceae (M), Euphorbiaceae, Geraniaceae, Goodeniaceae, Hyacinthaceae (M), Hydnoraceae, Lamiaceae, Loranthaceae, Menispermaceae, Mesembryanthemaceae, Molluginaceae, Orchidaceae (M), Passifloraceae, Pedaliaceae, Phytolaccaceae, Piperaceae, Polygonaceae, Portulacaceae, Rafflesiaceae, Rubiaceae (*Phyllohydrax*), Scrophulariaceae, Viscaceae, Vitaceae, Zygophyllaceae.

Plants with true bulbs:

Alliaceae (M), Amaryllidaceae (M), Hyacinthaceae (M).

Plants with milky or coloured to conspicuous watery sap:

Alismataceae (M), Apocynaceae, Araceae (M), Asteraceae, *Bixaceae, Burseraceae, Cabombaceae, Campanulaceae, Caricaceae, Cecropiaceae, Cochlospermaceae, Convolvulaceae (some spp. of *Ipomoea*), Euphorbiaceae, *Fumariaceae, Humiriaceae, Limnocharitaceae (M), Lobeliaceae, Moraceae, Moringaceae, Myristicaceae, Nymphaeaceae, *Papaveraceae, Sapotaceae.

Stem twining:

Annonaceae, Apocynaceae, Aristolochiaceae, Basellaceae, Behniaceae (=Luzuriagaceae) (M), Connaraceae, Convolvulaceae, Dioscoreaceae (M), Euphorbiaceae, Fabaceae, Flagellariaceae (M), Gnetaceae (G), Hyacinthaceae (M), Lauraceae, Linaceae, Malpighiaceae, Menispermaceae, Oleaceae, Polygonaceae, Solanaceae.

Tendrils present:

Apocynaceae, Bignoniaceae, Colchicaceae (M), Cucurbitaceae, Fabaceae, Flagellariaceae (M), *Fumariaceae, Linaceae, Menispermaceae, Passifloraceae, Rhamnaceae, Sapindaceae, Smilacaceae (M), Vitaceae.

Leaves absent or reduced to scales:

Amaranthaceae, Apocynaceae, Araceae (including Lemnaceae) (M); Asparagaceae (M), Asteraceae, Burmanniaceae (M), Cactaceae, Campanulaceae, *Casuarinaceae, Chenopodiaceae, Convolvulaceae, Cucurbitaceae, Cupressaceae (G), Euphorbiaceae, Geraniaceae, Hyacinthaceae (M), Hydnoraceae, Juncaceae (M), Lauraceae, Mesembryanthemaceae, Orchidaceae (M), Podostemaceae, Rafflesiaceae,

Restionaceae (M), Santalaceae, Scrophulariaceae (including Orobanchaceae), Viscaceae, Zannichelliaceae (M).

Leaves digitately compound (3 to many leaflets):

Anacardiaceae, Apiaceae, Araliaceae, Araceae (M), Arecaceae (M), Bignoniaceae, Burseraceae, *Cannabaceae, Capparaceae, Ceratophyllaceae, Cucurbitaceae, Dioscoreaceae (M), Droseraceae, Euphorbiaceae, Fabaceae, *Fumariaceae, Geraniaceae, Lamiaceae, Lentibulariaceae, Malvaceae (in broad sense), Oleaceae, Oxalidaceae, Passifloraceae, Pedaliaceae, Ranunculaceae, Rosaceae, Rutaceae, Sapindaceae, Verbenaceae, Vitaceae, Zygophyllaceae.

Leaves paripinnate:

Araliaceae, Balanitaceae, Cycadaceae (G), Fabaceae (especially Caesalpinioideae), Hydrostachyaceae, Meliaceae, Oxalidaceae, Ptaeroxylaceae, Sapindaceae, Stangeriaceae (G), Zamiaceae (G), Zygophyllaceae.

Leaves imparipinnate:

Anacardiaceae, Apiaceae, Araceae (M), Arecaceae (M), Asteraceae, Bignoniaceae, Brassicaceae, Burseraceae, Connaraceae, Fabaceae, *Fumariaceae, Geraniaceae, Haloragaceae, Hydrostachyaceae, Kirkiaceae, Leeaceae, Meliaceae, Melianthaceae, Moringaceae, Oleaceae, Proteaceae, Ranunculaceae, Resedaceae, Rosaceae, Rutaceae, Sapindaceae, Simaroubaceae, Stangeriaceae (G), Valerianaceae, Zamiaceae (G), Zygophyllaceae.

Leaves 2x or 3x pinnate:

Apiaceae, Araliaceae, Araceae (M), Asteraceae, Bignoniaceae, Fabaceae, *Fumariaceae, Geraniaceae, Hydrostachyaceae, Leeaceae, Lentibulariaceae, Meliaceae, Moringaceae, Proteaceae, Ranunculaceae.

Flowers densely crowded, sessile, usually small to minute; in heads, or on a fleshy axis surrounded by a conspicuous bract, or enclosed as in a fig; inflorescence often resembling a single flower:

Amaranthaceae, Apiaceae, Araceae (M), Araliaceae, Asteraceae, Balanophoraceae, *Casuarinaceae, Colchicaceae (M), Convolvulaceae, Dipsacaceae, Eriocaulaceae (M), Euphorbiaceae (*Euphorbia*), Fabaceae (Mimosoideae), Gentianaceae, Hamamelidaceae, Hyacinthaceae (M), Juncaceae (M), Moraceae, Pandanaceae (M), Portulacaceae, Proteaceae, Rhamnaceae (*Phylla*), Rubiaceae, Thymelaeaceae, Urticaceae, Verbenaceae, Xyridaceae (M).

Flowers in an umbel or pseudo-umbel:

Alismataceae (M), Alliaceae (M), Amaryllidaceae (M), Anthericaceae (M), Apiaceae, Apocynaceae, Araliaceae, Brexiaceae, Capparaceae, Cyperaceae (M), Euphorbiaceae, Fabaceae, Geraniaceae, Gisekiaceae, Hydrocharitaceae (M), Iridaceae (M), Leeaceae, Limnocharitaceae (M), Loranthaceae, Malpighiaceae, Menyanthaceae, Molluginaceae, Myrsinaceae, Myrtaceae, Nyctaginaceae, Oxalidaceae, Ranunculaceae, Rhamnaceae, Ruppiaceae (M), Rutaceae, Smilacaceae (M), Solanaceae, Taccaceae (M), Thymelaeaceae, Viscaceae.

Perianth absent:

Amaranthaceae, Araceae (including Lemnaceae) (M), Asteraceae, Balanophoraceae, Begoniaceae, *Casuarinaceae, Chenopodiaceae, Cupressaceae (G), Cymodoceaceae (M), Cyperaceae (M), Euphorbiaceae, Fabaceae (*Brachystegia*), Gunneraceae, Haloragaceae, Hydrostachyaceae, Moraceae, Myricaceae, Myrothamnaceae, Najadaceae (M), Pandanaceae (M), Pinaceae (G), Piperaceae, Poaceae (M), Podostemaceae, Podocarpaceae (G), Potamogetonaceae (M), Restionaceae (M), Ruppiaceae (M), Salicaceae, Stangeriaceae (G), Typhaceae (M), Viscaceae, Zamiaceae (G), Zannichelliaceae (M), Zosteraceae (M).

Perianth dry, pergamentaceous:

Amaranthaceae, *Cannabaceae, *Casuarinaceae, Cyperaceae (M), Eriocaulaceae (M), Juncaceae (M), Moraceae, Plantaginaceae, Poaceae (M), Restionaceae (M), Typhaceae (M), Xyridaceae (M).

Perianth spurred:

Balsaminaceae, Brassicaceae, Lentibulariaceae, Orchidaceae (M), Pedaliaceae, Scrophulariaceae, Tropaeolaceae, Valerianaceae, Violaceae.

Sex organs, at least of one sex, in cones or catkins:

*Casuarinaceae, Costaceae (M), Cupressaceae (G), Cycadaceae (G), Euphorbiaceae, Gunneraceae, Moraceae, Myricaceae, Myrothamnaceae, Pandanaceae (M), *Pinaceae (G), Podocarpaceae (G), Salicaceae, Stangeriaceae (G), Welwitschiaceae (G), Zamiaceae (G).

Anthers connate:

Apocynaceae, Araceae (M), Asteraceae, Balsaminaceae, Cucurbitaceae, *Fumariaceae, Hydnoraceae, Campanulaceae (including Lobeliaceae), Rafflesiaceae, Scrophulariaceae, Violaceae.

Gynoecium of 2 or more free carpels with separate styles:

Alismataceae (M), Annonaceae, Aponogetonaceae (M), Arecaceae (M), Cabombaceae, Connaraceae, Crassulaceae, Cymodoceaceae (M), Gisekiaceae, Juncaginaceae (M), Limnocharitaceae (M), Menispermaceae, Nymphaeaceae,

Phytolaccaceae, Potamogetonaceae (M), Ranunculaceae, Rosaceae, Ruppiaceae (M), Zannichelliaceae (M).

Fruit a circumscissile capsule: opening by a lid:

Aizoaceae, Convolvulaceae (*Operculina*), Hypoxidaceae (M), Lentibulariaceae, Lythraceae, Plantaginaceae, Plumbaginaceae, Portulacaceae, Primulaceae, Rubiaceae (*Mitracarpus*), Sphaenocleaceae.

Keys to families

KEY TO MAJOR GROUPS

- 1a Flowers absent; ovules/seeds borne on scales arranged in cones, or exposed, not in an ovary; pollen sacs borne on scales arranged in cones; trees to woody perennials; leaves mostly either linear to narrowly ovate or needle-, scale- or palm-like **GYMNOSPERMS** (key below)
- 1b Flowers present; ovules/seeds enclosed in an ovary; pollen borne in anthers; annual herbs to trees (**ANGIOSPERMS**):
- 2a Leaves usually net-veined, simple to variously compound, often with a petiole, base rarely sheathing the stem (e. g. Apiaceae, Ranunculaceae); stipules present or absent; flower parts usually in 4s or 5s; vascular bundles in stem usually arranged in a cylinder; embryo usually with 2 cotyledons **DICOTYLEDONS** (key below)
- 2b Leaves usually with parallel-convergent veins, simple or rarely compound or lobed but then leaflets or lobes with parallel, not net-like venation, leaves rarely with a petiole but base usually sheathing the stem at least partly; stipules absent; flower parts usually in 3s; vascular bundles scattered in stem; embryo with 1 cotyledon **MONOCOTYLEDONS** (key on p. 23)

KEY TO GYMNASPERMS (pp. 26–29)

- 1a Leaves 2, opposite, permanent, sprawling on the ground and often torn lengthwise by the wind **WELWITSCHIACEAE**
- 1b Leaves indefinite in number, produced in succession from apex of stems:
- 2a Palm- or fern-like plants with fibrous stems or trunks, or stemless with a tuberous rootstock:
- 3a Stemless, somewhat fern-like plants with a tuberous rootstock; leaves deciduous from their base; leaflets with midrib and dichotomously branched lateral veins **STANGERIACEAE**
- 3b Stems above and often below ground, covered with persistent leaf bases, sometimes up to 10 m tall, with a crown of palm-like leaves:
- 4a Leaflets with thick midrib and no lateral veins; (2–)4–10 pairs of ovules borne on the margins of the up to 0.3 m long female fronds spirally arranged in a dense whorl at apex of stem **CYCADACEAE**
- 4b Leaflets with longitudinal parallel venation and no midrib; 2 ovules are borne on the adaxial (upper) side of stalked scales tightly packed in large cylindrical to ovoid cones borne at or near the apex of the stem **ZAMIACEAE**
- 2b Trees or shrubs with hardwood stems, or remotely branched lianes; leaves simple:
- 5a Remotely branched lianes with decussate leaves **GNETACEAE**
- 5b Trees or shrubs with hardwood stems; leaves spirally arranged, whorled or decussate:
- 6a Leaves small and scale-like; ovules/seeds borne between scales of a rounded woody, rarely fleshy cone **CUPRESSACEAE**
- 6b Leaves well-developed, linear to narrowly ovate or needle-like:
- 7a Dioecious trees or shrubs; leaves linear to narrowly ovate; ovules/seeds 1 or 2 borne on a receptacle (often swollen and fleshy), not in cones **PODOCARPACEAE**
- 7b Monoecious trees or shrubs; leaves mostly needle-like, 1 or few united at base by a membranous sheath; female cones with many spirally arranged scales, leathery or fleshy at first, mostly becoming stiff and woody later, each scale bearing 2 ovules/seeds ***PINACEAE**

KEY TO DICOTYLEDONS (pp. 30–374)

- 1a Gynoecium composed of 2 or more **free carpels** with separate styles and stigmas (in Nymphaeaceae the carpels are sunk in a fleshy disc):
- 2a Petals absent; perianth members all \pm similar **Group 1** (p. 8)
- 2b Petals present **Group 2** (p. 8)
- 1b Gynoecium composed of **1 carpel** or of 2 or more \pm **united carpels** with united or free styles, or if carpels free below then styles or stigmas united:
- 3a **Placentation parietal or marginal**: ovules 2 or more in the ovary, borne on its outer wall or sometimes on intrusions thereof:
- 4a Ovary superior:
- 5a Petals absent; perianth members, if present, all \pm similar **Group 3** (p. 8)
- 5b Petals free **Group 4** (p. 9)
- 5c Petals \pm united **Group 5** (p. 10)
- 4b Ovary \pm inferior **Group 6** (p. 11)
- 3b **Placentation axile, basal or apical**: 1 or more ovules in the ovary, borne on the central axis, or the base or apex of the ovary, or placentation indistinct:
- 6a Ovary superior:
- 7a Petals absent; perianth members, if present, all \pm similar **Group 7** (p. 11)
- 7b Petals free **Group 8** (p. 14)
- 7c Petals \pm united **Group 9** (p. 18)
- 6b Ovary inferior:
- 8a Petals absent; perianth members, if present, all \pm similar **Group 10** (p. 20)
- 8b Petals free **Group 11** (p. 21)
- 8c Petals \pm united **Group 12** (p. 22)

GROUP 1 (*Carpels free; petals absent*)

- 1a Stamens perigynous, arising at mouth of calyx tube; sepals united below, imbricate; leaves pinnate or digitate or palmately lobed; stipules present; trees, shrubs or herbs, sometimes scrambling and with prickles **ROSACEAE**
- 1b Stamens hypogynous; sepals free or if united near base then valvate and stamens united into a column:
- 2a Stamens united into a column **STERCULIOIDEAE—MALVACEAE**
- 2b Stamens free:
- 3a Leaves compound, sometimes decompound; sepals petaloid; herbs or soft-wooded climbing or trailing plants **RANUNCULACEAE**
- 3b Leaves simple:
- 4a Flowers unisexual; plants dioecious; woody climbers with alternate leaves:
- 5a Sepals 6–18 in 2 or more whorls; stamens 3–6, free or united into a synandrium; flowers in cymes or racemes; leaves entire or palmately lobed **MENISPERMACEAE**
- 5b Sepals 4 or 5 in 1 whorl; stamens 10–15, free; flowers in elongated racemes; leaves entire **PHYTOLACCACEAE**
- 4b Flowers bisexual; herbs with opposite or subopposite leaves:
- 6a Leaves entire; calyx herbaceous; flowers small, in cymes or panicles **GISEKIACEAE**
- 6b Leaves toothed or lobed; calyx petaloid; flowers large and conspicuous, solitary or few together **RANUNCULACEAE**

GROUP 2 (*Carpels free but sometimes pressed together; petals present*)

- 1a Leaves opposite; stipules absent; carpels as many as petals; plants often succulent **CRASSULACEAE**
- 1b Leaves alternate, sometimes all radical:
- 2a Aquatic herbs with floating leaves on long petioles; leaf blades ± peltate; flowers solitary, on long scapes, often large and conspicuous:
- 3a Carpels sunk in a fleshy disc; petals many; leaf blades cordate as well as peltate **NYMPHAEACEAE**
- 3b Carpels not sunk in a fleshy disc; petals 3; leaf blades peltate, not cordate **CABOMBACEAE**
- 2b Terrestrial plants; leaf blades not peltate:
- 4a Stamens perigynous, arising at mouth of calyx tube; leaves pinnate or digitate; stipules present; trees, shrubs or herbs, sometimes scrambling with prickles **ROSACEAE**
- 4b Stamens hypogynous, not arising on calyx:
- 5a Sepals 6–24 in 2 or more whorls, free or inner ones united; dioecious shrublets or woody climbers with small flowers **MENISPERMACEAE**
- 5b Sepals 2–5 in 1 whorl, free or united:
- 6a Leaves compound or deeply divided:
- 7a Herbs **RANUNCULACEAE**
- 7b Trees or shrubs **CONNARACEAE**
- 6b Leaves simple, entire:
- 8a Leaves succulent; a nectary gland present at base of each carpel; stamens 8–12 **CRASSULACEAE**
- 8b Leaves herbaceous; without a nectary at base of each carpel; stamens mostly more than 12, if 5 + 5 then grey-green maritime shrubs:
- 9a Herbs **RANUNCULACEAE**
- 9b Trees or shrubs, sometimes trailing:
- 10a Leaves palmatinerved **BROWNLOWIOIDEAE (Christiana)—MALVACEAE**
- 10b Leaves penninerved or venation ± invisible:
- 11a Sepals 2 or 3, valvate, free or united; anthers often longer than filaments, often with a broad prolongation of the connective above the thecae; flowers solitary or fasciculate or in few-flowered cymes **ANNONACEAE**
- 11b Sepals 5, imbricate, free; anthers much shorter than filaments, and anther connective without prolongation:
- 12a Stamens many; ovules few to many per carpel **DILLENACEAE**
- 12b Stamens 10 in whorls of 5; ovules 2 per carpel **SURIANACEAE**

GROUP 3 (*Placentation parietal; ovary superior; petals absent*)

- 1a Submerged aquatic herbs, fern-like owing to pinnately much-divided leaves; plants dioecious; flowers in elongated, pedunculate spikes; calyx absent **HYDROSTACHYACEAE**
- 1b Terrestrial plants, not fern-like in habit:
- 2a Leaves pinnate or 2-foliolate; trees **FABACEAE**
- 2b Leaves simple or digitately 3-foliolate, sometimes reduced to scales:
- 3a Flowers unisexual; plants dioecious or monoecious; leaves simple, often with salicoid dentation; flowers usually with a disc or separate disc glands; trees or shrubs **SALICACEAE**
- 3b Flowers bisexual; leaves simple or variously divided, if dentate then dentition not salicoid; disc and corona absent or present; plants herbaceous or woody:
- 4a Flowers with a fimbriate corona outside stamens; herbs or shrubs, often climbing with tendrils **PASSIFLORACEAE**
- 4b Flowers without corona; tendrils absent:
- 5a Herbs or low shrublets; fruit a small capsule, either 1-locular with many ovules or 2-locular with 1 or 2 ovules per locule:
- 6a Capsule (silicula) with 2 1- or 2-seeded locules divided by a persistent, often membranous partition **BRASSICACEAE**
- 6b Capsule 1-locular, often open at the top, with many ovules on 2–5 placentas **RESEDACEAE**
- 5b Shrubs or trees; fruit, if a capsule, with more than 2 seeds per locule:
- 7a Ovary borne on a distinct stalk (gynophore) **CAPPARACEAE**
- 7b Ovary sessile or subsessile:

- 8a Ovary with a single parietal placenta; style 1, short; stigma peltate; disc absent **APHLOIACEAE**
 8b Ovary with 2 or more parietal placentas; styles 1–8, entire or branched; disc or disc glands usually present **SALICACEAE**

GROUP 4 (*Placentation parietal; ovary superior; petals free*)

- 1a Stamens 6, tetradynamous (inner 4 long, outer 2 short); sepals 4; petals 4 or fewer; leaves without stipules; herbs **BRASSICACEAE**
 1b Stamens not tetradynamous:
 2a Gynoecium composed of 1 carpel, thus with only 1 placenta in the ovary:
 3a Flowers regular; petals 5 or fewer, sometimes 1; leaves simple or compound; trees or shrubs or herbs, sometimes climbing **FABACEAE**
 3b Flowers irregular:
 4a Leaves 2-pinnate; stipules present; trees, shrubs or herbs, sometimes climbing; flowers in spikes or heads **FABACEAE**
 4b Leaves simple, 1-pinnate or 1–3-foliolate:
 5a Leaves pinnate or 3-foliolate, the leaflets dotted with pellucid glands, at least at margin; trees or shrubs **RUTACEAE**
 5b Leaves simple or 1-foliolate, without pellucid glands:
 6a Leaves toothed; stipules present; stamens as many as and opposite petals, united at base; herbs or small shrubs
 **STERCULIOIDEAE—MALVACEAE**
 6b Leaves entire; stipules absent; stamens more numerous than petals; trees or shrubs, sometimes climbing:
 7a Sepals 5; petals 5; flowers in few-flowered racemes **CONNARACEAE**
 7b Sepals 3; petals 6; flowers solitary, axillary **ANNONACEAE**
 2b Gynoecium composed of 2 or more united carpels, thus with 2 or more placentas:
 8a Leaves scale-like, dense; shrubs or small trees **TAMARICACEAE**
 8b Leaves not scale-like:
 9a Leaves opposite or whorled, simple, not all radical; herbs:
 10a Leaves dotted with pellucid glands; stamens more than twice as many as petals, often ± grouped into bundles; terrestrial plants
 **CLUSIACEAE**
 10b Leaves bladdery, whorled; stamens as many as petals; free-floating aquatics **DROSERACEAE**
 9b Leaves alternate or all radical:
 11a Flowers unisexual:
 12a Flowers often with a single or double, cup-shaped or variously dissected corona; disc often present; herbaceous or woody climbers, shrubs or small trees, often with tendrils; leaves sometimes digitate or palmately lobed **PASSIFLORACEAE**
 12b Flowers without corona; disc present or absent; trees or shrubs without tendrils; leaves simple, not lobed:
 13a Resinous trees or shrubs with schizogenous secretory canals; sepals, petals and stamens all 5; fruit a ± globose capsule usually opening with 2 valves, with 4–8 orange to red, sticky seeds borne in 2 rows on each valve **PITTOSPORACEAE**
 13b Combination of characters not as above:
 14a Anthers shorter than 1 mm or inflorescence epiphyllous; disc absent **ACHARIACEAE**
 14b Anthers longer than 1 mm; inflorescence not epiphyllous; disc present **SALICACEAE**
 11b Flowers bisexual or plants sometimes polygamous:
 15a Ovary borne on a distinct gynophore:
 16a Flowers with a fimbriate or hairy corona outside stamens; styles 3–6; herbs, shrubs or small trees often with axillary tendrils
 **PASSIFLORACEAE**
 16b Flowers without a corona; style 1 or stigma sessile; tendrils absent:
 17a Flowers mostly 4-merous; leaves without extrafloral nectaries and mostly ± glabrous; ovary 1-locular throughout
 **CAPPARACEAE**
 17b Flowers 5-merous; leaves hairy, often glandular, with an extrafloral nectary at base of midrib; ovary 3–5-locular, sometimes 1-locular towards apex **DIPTEROCARPACEAE**
 15b Ovary sessile or subsessile:
 18a Flowers ± irregular:
 19a Leaves 2- or 3-pinnate; trees; flowers in axillary panicles; stamens 5, alternating with 5 staminodes **MORINGACEAE**
 19b Leaves simple or digitate; herbs or sometimes shrubs or small trees:
 20a Connective of anthers prolonged above thecae into an appendage; flowers mostly solitary; fruit a 3-valved capsule;
 leaves simple **VIOLACEAE**
 20b Connective of anthers not prolonged above thecae; flowers in terminal racemes or spikes:
 21a Fruit a capsule dehiscent throughout its length by 2 valves; leaves simple or digitate **CAPPARACEAE**
 21b Fruit a capsule gaping at apex; leaves simple, sometimes pinnately lobed or divided **RESEDACEAE**
 18b Flowers regular:
 22a Stamens 10, with filaments connate into a tube ± as long as the 10 petals **CANELLACEAE**
 22b Combination of characters not as above:
 23a Stamens more numerous than petals, or as many and opposite them:
 24a Flowers with a disc and/or a corona:
 25a Flowers often with a single or double corona, cup-shaped or variously dissected; herbaceous or woody climbers,
 shrubs or small trees, often with tendrils; leaves sometimes digitate or palmately lobed **PASSIFLORACEAE**
 25b Flowers without corona; trees or shrubs without tendrils; leaves simple, not lobed:

- 26a Branches and inflorescence axis with rusty scales; petiole with basal and apical pulvinus; pedicels with 5 or 6 apical glands; fruit a loculicidal capsule with dense stiff bristles; anthers horseshoe-shaped, opening by short, apical, pore-like slits *BIXACEAE
- 26b Branches and inflorescence axis without scales; petioles without pulvinus; fruit a fleshy berry, a capsule, or large, globose and indehiscent but without dense bristles; anthers opening by longitudinal slits SALICACEAE
- 24b Flowers without a disc or a corona:
- 27a Perennial or annual herbs:
- 28a Leaves prickly, often pinnately lobed; sepals 2 or 3, caducous; fruit a capsule dehiscent by 4–6 short valves at the top *PAPAVERACEAE
- 28b Leaves glabrous, entire; sepals 5; fruit a capsule opening by 3 septical valves (*Sauvagesia*) OCHNACEAE
- 27b Trees or shrubs:
- 29a Leaves palmately lobed; fruit a 3–5-valved capsule COCHLOSPERMACEAE
- 29b Leaves simple; fruit a berry, a capsule, a nut or of separate drupelets:
- 30a Gynoecium of 5–15 ± free, 1-ovulate carpels united by their completely fused styles; fruit of separate 1-seeded drupelets OCHNACEAE
- 30b Gynoecium with a 1–5-locular ovary with 1–many ovules; fruit a capsule, nut-like or a berry:
- 31a Fruit nut-like, 1-seeded, with a very hard pericarp surrounded by 5 wing-like, accrescent, prominently veined sepals; leaves entire DIPTEROCARPACEAE
- 31b Fruit a capsule or berry, not surrounded by wing-like sepals; leaves entire or toothed ACHARIACEAE
- 23b Stamens as many as and alternating with petals:
- 32a Styles 2–5, free or shortly united at base:
- 33a Leaves bearing many sticky, stipitate glands; insectivorous herbs DROSERACEAE
- 33b Leaves without sticky glands; plants not insectivorous:
- 34a Flowers with a conspicuous, fimbriate or hairy corona outside stamens; herbs or shrubs, often climbing with tendrils PASSIFLORACEAE
- 34b Flowers without a corona, or corona very small and inconspicuous; herbs without tendrils TURNERACEAE
- 32b Style 1:
- 35a Stamens variously united, connective of anthers prolonged above thecae into an appendage; leaves with stipules VIOLACEAE
- 35b Stamens ± free, anthers without an appendage; leaves without stipules PITTOSPORACEAE

GROUP 5 (*Placentation parietal; ovary superior; petals ± united*)

- 1a Gynoecium consisting of 1 carpel, therefore with only 1 placenta in ovary; leaves with or without stipules:
- 2a Leaves simple or compound, with stipules or stipular spines; fruit a legume FABACEAE
- 2b Leaves simple; stipules absent; fruit a drupe containing a solitary U-shaped seed MENISPERMACEAE
- 1b Gynoecium consisting of 2 or more united carpels, therefore with 2 or more placentas in ovary; leaves without stipules:
- 3a Flowers irregular:
- 4a Leaves pinnately or ternately compound:
- 5a Leaves alternate; annual herbs with watery sap, sometimes with tendrils; outer petals often spurred or saccate at base *FUMARIACEAE
- 5b Leaves opposite; trees with large pendulous, sausage-like fruits BIGNONIACEAE
- 4b Leaves simple, sometimes reduced to scales; herbs:
- 6a Plants parasitic on roots; leaves reduced to scales; stamens 4 SCROPHULARIACEAE
- 6b Plants not parasitic; leaves (or solitary leaf) well-developed; stamens 2 GESNERIACEAE
- 3b Flowers regular; stamens as many as corolla lobes or more numerous:
- 7a Leaves opposite:
- 8a Petals many; succulent herbs or shrubs with succulent leaves MESEMBRYANTHEMACEAE
- 8b Petals 4–6:
- 9a Shrubs or woody climbers with latex; fruit a large berry APOCYNACEAE
- 9b Herbs without latex; fruit a capsule, rarely berry-like GENTIANACEAE
- 7b Leaves alternate or basal, sometimes small and scale-like:
- 10a Flowers unisexual; plants monoecious or dioecious, with large leaves clustered at and near apex of unbranched to sparsely branched, sometimes prickly stems and branches CARICACEAE
- 10b Flowers bisexual; habit of plants not as above:
- 11a Leaves small, scale-like; trees or shrubs, often halophytic TAMARICACEAE
- 11b Leaves well-developed:
- 12a Stamens more numerous than petals; petals twice as many as sepals; trees or shrubs, sometimes climbing ANNONACEAE
- 12b Stamens, petals and sepals all 5(6):
- 13a Herbs, aquatic or wetland; stamens arising on corolla tube MENYANTHACEAE
- 13b Small trees or shrubs; stamens free from corolla tube PITTOSPORACEAE

GROUP 6 (*Placentation parietal; ovary ± inferior*)

- 1a Plants parasitic on roots of shrubs or trees, low, ± fleshy:
- 2a Perianth tubular, 3- or 4(5)-lobed, resembling a fungus **HYDNORACEAE**
- 2b Perianth cup-shaped, 4–9-lobed, fused towards base **RAFFLESACEAE**
- 1b Plants not parasitic:
- 3a Petals absent: perianth members all ± similar:
- 4a Flowers irregular, usually with an S-shaped tube, medium-sized to large **ARISTOLOCHIACEAE**
- 4b Flowers regular; tepals fused only towards base; fruit winged, horned or spiny **AIZOACEAE**
- 3b Petals present: perianth differentiated into calyx and corolla:
- 5a Flowers unisexual; plants usually climbing with tendrils; leaves often palmately lobed or deeply divided **CUCURBITACEAE**
- 5b Flowers bisexual; plants without tendrils; leaves mostly entire, rarely with palmate venation:
- 6a Leaves absent or reduced to scales; succulent shrubs or shrublets, sometimes epiphytic. **CACTACEAE**
- 6b Leaves mostly well-developed:
- 7a Succulent herbs or shrubs with succulent leaves; leaves mostly opposite; petals many **MESEMBRYANTHEMACEAE**
- 7b Plants not succulent; leaves opposite or alternate; petals fewer than 10:
- 8a Leaves opposite or whorled, with interpetiolar stipules **RUBIACEAE**
- 8b Leaves alternate; stipules, if present, not interpetiolar:
- 9a Aquatic herbs with usually floating peltate leaves **NYMPHAEACEAE**
- 9b Trees or shrubs:
- 10a Petals mostly larger and more numerous than sepals; anthers longer than 1 mm, often linear; disc or separate disc glands mostly present **ACHARIACEAE**
- 10b Petals absent or present, mostly as many as and similar to sepals; anthers mostly shorter than 1 mm and not much longer than broad; disc or disc glands mostly absent **SALICACEAE**

GROUP 7 (*Placentation axile, basal or apical; ovary superior; petals absent*)

- 1a Ovary with 2 or more ovules in each locule:
- 2a Plants aquatic; moss-like or liverwort-like in habit, growing on rocks; flowers small and inconspicuous; stamens 1 or 2; ovary with many ovules; fruit a capsule **PODOSTEMACEAE**
- 2b Plants terrestrial, not moss-like or liverwort-like in habit:
- 3a Leaves reduced to minute scales forming toothed sheaths surrounding nodes of pine needle-like, jointed branchlets; trees with unisexual flowers; male flowers in spikes, female flowers in heads; stamen 1; ovary 1-locular with 2 collateral ovules; style with 2 elongated branches ***CASUARINACEAE**
- 3b Leaves well-developed, not reduced to scales:
- 4a Leaves opposite or whorled or all radical:
- 5a Flowers unisexual; trees, shrubs or shrublets:
- 6a Calyx absent; leaves toothed at apex, fan-like; flowers in catkin-like spikes; ovules many in each locule **MYROTHAMNACEAE**
- 6b Calyx present; leaves entire, not fan-like; flowers solitary or fasciculate in axils of leaves; ovules 2 in each locule:
- 7a Leaves with stipules; plants dioecious; stamens very many, spirally arranged on prolonged floral axis **EUPHORBIACEAE**
- 7b Leaves without stipules; plants monoecious; stamens 4–6 **BUXACEAE**
- 5b Flowers bisexual; herbs:
- 8a Calyx spurred, spur adnate to pedicel; ovary beaked; leaves toothed or lobed **GERANIACEAE**
- 8b Calyx not spurred; ovary without stout central axis; leaves entire:
- 9a Sepals fused below; stamens perigynous, arising on calyx tube:
- 10a Style 1; ovary 1–5-locular, with many ovules in each locule; fruit a capsule **LYTHRACEAE**
- 10b Styles 2–5, or if 1 then ovary 1-locular with few ovules; fruit a circumscissile capsule **AIZOACEAE**
- 9b Sepals free or almost so; stamens hypogynous:
- 11a Ovary 2–5-locular, with axile placentas **MOLLUGINACEAE**
- 11b Ovary 1-locular with basal or free-central placentation **CARYOPHYLLACEAE**
- 4b Leaves alternate, not all radical:
- 12a Leaves pinnate; trees, polygamous or with flowers all unisexual; ovary 2-locular with 2 ovules in each locule; fruit indehiscent **SAPINDACEAE**
- 12b Leaves simple or digitate:
- 13a Ovary 1-locular; flowers in racemes or spikes:
- 14a Flowers mostly bisexual but plants sometimes polygamous:
- 15a Calyx scarious; fruit a ± circumscissile capsule; herbs **AMARANTHACEAE**
- 15b Calyx of 4 thickish lobes; fruit consisting of 1 or more follicles; gland-dotted shrubs **RUTACEAE**
- 14b Flowers unisexual; plants dioecious; calyx, if present, not scarious; fruit a drupe or a capsule; trees or shrubs, sometimes climbing:
- 16a Perianth absent; inflorescences small dense catkins; seeds many, very small with a basal tuft of long dense hairs **SALICACEAE**
- 16b Perianth present; combination of characters not as above:

- 17a Leaves with stipules; calyx imbricate; stamens opposite sepals; styles 3, usually 2-lobed **EUPHORBIACEAE**
- 17b Leaves without stipules; calyx valvate; stamens alternating with sepals; style absent, stigma sessile and multiradiate
..... **ICACINACEAE**
- 13b Ovary 2- or more-locular:
- 18a Gynoecium composed of 3 or more loosely united carpels, in fruit separating into as many follicles (or fewer by abortion); trees or shrubs with flowers both bi- and unisexual; leaves simple or digitate; sepals valvate, united below; stamens united into a column **STERCULIOIDEAE—MALVACEAE**
- 18b Gynoecium composed of completely united carpels, in fruit forming a capsule, or indehiscent or finally separating into winged cocci:
- 19a Ovary borne on a distinct gynophore; flowers bisexual; shrubs with solitary, pedunculate, axillary flowers **CAPPARACEAE**
- 19b Ovary sessile or subsessile:
- 20a Flowers bisexual; perianth segments sepaloid externally and petaloid internally **AIZOACEAE**
- 20b Flowers mostly unisexual; plants occasionally polygamous:
- 21a Leaves with stipules; fruit a capsule, or indehiscent, or separating into 2 winged cocci; trees or shrubs or herbs
..... **EUPHORBIACEAE**
- 21b Leaves without stipules; fruit a septicidal capsule with 2 or more longitudinal, membranous wings; shrubs or trees
..... **SAPINDACEAE**
- 1b Ovary with 1 ovule in each locule:
- 22a Ovary 2- or more-locular:
- 23a Leaves pinnate or 3-foliolate:
- 24a Leaves pinnate, alternate; trees or shrubs **SAPINDACEAE**
- 24b Leaves 3-foliolate, opposite; subshrubs **ZYGOPHYLLACEAE**
- 23b Leaves simple, sometimes lobed or much divided or reduced to scales or stipular spines:
- 25a Flowers unisexual or plants polygamous:
- 26a Ovary 5-locular, carpels loosely united and becoming separate in fruit; calyx present, valvate, sepals united below; stamens 5–10, united into a column; leaves alternate; trees or shrubs **STERCULIOIDEAE—MALVACEAE**
- 26b Ovary 2–4-locular, carpels completely united and not becoming separate in fruit; leaves alternate or sometimes opposite, sometimes reduced to scales or stipular spines; calyx present or absent, sepals valvate or imbricate; stamens 1–many, free or variously united; habit varying from annuals to trees **EUPHORBIACEAE**
- 25b Flowers bisexual:
- 27a Sepals fused into a very short to long tube; stamens perigynous or hypogynous:
- 28a Stamens arising on upper portion of calyx tube, in 2 whorls; fruit a drupe; shrubs **THYMELAEACEAE**
- 28b Stamens not arising on sepals, sometimes in groups; fruit a capsule or flat samara with membranous wings:
- 29a Trees with dentate leaves; fruit a flattened samara **CELTIDACEAE**
- 29b Herbs, shrublets or shrubs with entire, often somewhat succulent leaves; fruit a capsule **AIZOACEAE**
- 27b Sepals free; stamens hypogynous or almost so:
- 30a Leaves ± toothed or pinnately lobed or divided; style 1; fruit a flattened silicle or separating into 2 cocci; herbs **BRASSICACEAE**
- 30b Leaves entire; styles 2 or more, free or united at base:
- 31a Ovary 7–10-locular; fruit a berry; flowers in spike-like racemes; herbs or shrublets **PHYTOLACCACEAE**
- 31b Ovary 2–5-locular; fruit a loculicidal capsule or separating into 2 cocci, cocci sometimes winged along back; flowers in lax or dense cymes; herbs **MOLLUGINACEAE**
- 22b Ovary 1-locular:
- 32a Leaves absent or reduced to scales; flowers spicate:
- 33a Slender, twining, parasitic plants; flowers not immersed in rachis of spike; stamens 6–9, accompanied by staminodes; anthers opening by valves **LAURACEAE**
- 33b Succulent, maritime herbs with articulated branches, not parasitic; flowers immersed in rachis of spike; stamens 1 or 2; anthers opening by longitudinal slits **CHENOPODIACEAE**
- 32b Leaves present, well-developed, not reduced to scales:
- 34a Leaves with stipules, sometimes forming a sheath (ocrea) surrounding the stem:
- 35a Leaves 3- or 4-pinnate; calyx petaloid; fruit a stipitate achene borne on a slender pedicel; herbs **RANUNCULACEAE**
- 35b Leaves simple or digitate:
- 36a Ovule pendulous from apex or near apex of ovary; flowers unisexual or plants polygamous:
- 37a Flowers densely spicate or capitate, or crowded in or on an open or flat receptacle or inside a hollow, almost closed receptacle (fig), female flowers sometimes immersed in tissue of receptacle; calyx sometimes absent; trees, shrubs or herbs
..... **MORACEAE**
- 37b Flowers solitary or fasciculate or in cymes or racemes or panicles; calyx sometimes reduced or absent in female flowers:
- 38a Annual herbs; leaves opposite or alternate, all or lower ones palmately divided; male flowers in elongated panicles; female flowers spicate, enclosed by bracts; fruit dry, indehiscent ***CANNABACEAE**
- 38b Trees or shrubs; leaves alternate:
- 39a Stamens as many as calyx segments, 4 or 5; style 2-branched with simple or divided stigmas; fruit a drupe; trees or shrubs **CELTIDACEAE**
- 39b Stamens more numerous than calyx segments; style unbranched, sometimes very short:

- 40a Flowers solitary or paired in axils of leaves; leaves 1–3-foliolate with small, narrow leaflets; heath-like shrubs
..... **ROSACEAE**
- 40b Flowers in axillary racemes or panicles; leaves simple; trees **EUPHORBIACEAE**
- 36b Ovule arising from base or near base of ovary:
- 41a Leaves opposite, marked with cystoliths; flowers unisexual; herbs or shrubs **URTICACEAE**
- 41b Leaves alternate:
- 42a Perianth absent; flowers minute, in dense spikes; shrubs, sometimes climbing **PIPERACEAE**
- 42b Perianth present:
- 43a Styles 2 or 3, free or united below; stamens 4–8; fruit a small nut; stipules often forming an ocrea surrounding the stem; herbs or shrubs, sometimes climbing **POLYGONACEAE**
- 43b Style 1 or absent; stamens 5 or fewer:
- 44a Flowers bisexual; sepals united below, free portions alternating with lobes of an epicalyx; style arising laterally from near base of ovary; herbs with palmately lobed leaves **ROSACEAE**
- 44b Flowers unisexual; sepals free or united, without an epicalyx; style or sessile stigma terminal:
- 45a Herbs, subshrubs or shrubs, sometimes softwooded small trees or climbers, sometimes with stinging hairs; leaves simple, sometimes 3–5(–7)-lobed, often marked with cystoliths; plants monoecious or dioecious; stamens inflexed in bud, abruptly bending in dehiscence **URTICACEAE**
- 45b Trees or shrubs, often with stilt-roots, without stinging hairs; leaves palmatifid to palmatisect, without cystoliths; plants strictly dioecious; stamens straight in bud, not abruptly bending in dehiscence **CECROPIACEAE**
- 34b Leaves without stipules:
- 46a Submerged, aquatic herbs; leaves whorled, deeply and bifurcately divided into linear or filiform segments; flowers unisexual, solitary and sessile in axils of leaves **CERATOPHYLLACEAE**
- 46b Plants not aquatic; leaves alternate or opposite, undivided or sometimes pinnately divided:
- 47a Perianth absent; flowers in spikes:
- 48a Flowers unisexual; stamens 3–12; styles 2, free or shortly united below; leaves alternate; trees or shrubs **MYRICACEAE**
- 48b Flowers bisexual; stamens 2; style absent, stigma sessile; leaves alternate or opposite or whorled; herbs, sometimes trailing or climbing or epiphytic **PIPERACEAE**
- 47b Perianth present, at least in male flowers:
- 49a Stamens twice as many as calyx segments or more numerous:
- 50a Ovule erect from base of ovary; fruit enclosed in persistent, longitudinally 4-winged calyx tube; spiny shrubs with small, linear, often fasciculate leaves; plants polygamo-dioecious **NYCTAGINACEAE**
- 50b Ovule pendulous from apex of ovary; fruit not enclosed in winged calyx tube; plants not spiny:
- 51a Flowers bisexual; sepals united into an elongated tube; stamens arising on calyx tube; style elongated, slender; shrubs, often heath-like, or sometimes trees, with alternate or opposite leaves **THYMELAEACEAE**
- 51b Flowers unisexual; plants dioecious; sepals shortly united at base; stamens not arising on calyx tube; style absent, stigma sessile; shrubs or trees with opposite or subopposite leaves **MONIMIACEAE**
- 49b Stamens fewer than twice as many as calyx segments, sometimes accompanied by staminodes:
- 52a Anthers opening by valves; calyx 6-lobed; stamens 6–9, accompanied by staminodes; trees **LAURACEAE**
- 52b Anthers opening by longitudinal slits; calyx with 3–5 segments or lobes:
- 53a Leaves opposite or subopposite:
- 54a Perianth lobes ± petaloid, united into a tube constricted above ovary, lower portion of tube persistent and enclosing fruit and often glandular on outside; stamens not accompanied by staminodes; herbs or climbing shrubs
..... **NYCTAGINACEAE**
- 54b Perianth lobes dry and ± scarious, free or shortly united at base, not forming a tube constricted above ovary; stamens as many as and opposite calyx segments, often alternating with staminodes; herbs or shrubs **AMARANTHACEAE**
- 53b Leaves alternate:
- 55a Twining herbs; sepals (petals?) united below into a tube with 2 adnate bracteoles outside; flowers in axillary, pedunculate spikes **BASELLACEAE**
- 55b Plants not twining, or if so, woody lianes; sepals free or united, without adnate bracteoles:
- 56a Perianth of 2–4 valvate segments; trees or shrubs:
- 57a Flowers bisexual, in large, bracteate heads or in elongated spikes or racemes; stamens 4, free, opposite to and arising on calyx segments; fruit a nut; seed not arillate **PROTEACEAE**
- 57b Flowers unisexual, in small, solitary or clustered (sometimes paniculate) heads; stamens 3–5, united into a column; fruit with a thick, fleshy, dehiscent pericarp; seed arillate **MYRISTICACEAE**
- 56b Perianth of 3–5 imbricate segments or sometimes almost completely tubular with indistinct segments; herbs, shrubs or woody climbers:
- 58a Stamens fewer than calyx segments and mostly alternating with them; leaves small, linear; flowers in elongated, simple spikes **PHYTOLACCACEAE**
- 58b Stamens as many as or fewer than calyx segments and opposite them:
- 59a Disc of 4 or 5 fleshy lobes alternating with petals (may be taken for sepals as calyx is reduced to a rim); woody climbers **OPILIACEAE**
- 59b Disc absent:

- 60a Perianth dry and \pm scarious, free or shortly united at base; leaves entire **AMARANTHACEAE**
 60b Perianth herbaceous, free or \pm united into a tube; leaves entire or \pm toothed or pinnately divided
 **CHENOPODIACEAE**

GROUP 8 (*Placentation axile, basal or apical; ovary superior; petals free but may adhere to base of staminal tube*)

1a Ovary 1-locular, sometimes septate towards base:

2a Sepals 1 or 2, free, sometimes caducous:

3a Flowers unisexual; plants dioecious; sepals 1 or 2; petals 1–4; stamens united into a synandrium; leaf blades peltate or subpeltate; woody climbers **MENISPERMACEAE**

3b Flowers bisexual or, if unisexual, then stamens free; sepals 2; petals 4 or 5; leaf blades not peltate; herbs:

4a Flowers irregular; ovary with 1 ovule; fruit a nut; leaves much divided ***FUMARIACEAE**4b Flowers regular; ovary with many ovules; fruit a capsule; leaves entire, fleshy **PORTULACACEAE**2b Sepals (or calyx lobes) 3 or more, sometimes \pm obsolete (calyx annular):

5a Leaves opposite or whorled, not all radical:

6a Leaves with stipules; herbs or shrublets **CARYOPHYLLACEAE**

6b Leaves without stipules:

7a Petals and stamens perigynous, arising on calyx tube:

8a Ovary with 1 apical, pendulous ovule; fruit indehiscent, dry or fleshy; often heath-like **THYMELAEACEAE**8b Ovary with many ovules on a basal or free-central placenta; stamens twice as many as petals or fewer; herbs, shrubs or trees
 **LYTHRACEAE**

7b Petals and stamens hypogynous or only slightly perigynous, not arising on calyx:

9a Herbs; ovary with 1–many ovules on a basal or free-central placenta; fruit a capsule **CARYOPHYLLACEAE**

9b Trees or shrubs; ovary with 1 or 2 ovules; fruit drupaceous; stamens as many as and alternating with petals:

10a Filaments united at base into a tube or cup **SALVADORACEAE**10b Filaments \pm free:11a Ovule 1; styles 3, free or united at base; flowers unisexual; plants dioecious or polygamous **ANACARDIACEAE**

11b Ovules 2–8; style 1 or stigma sessile; flowers bisexual:

12a Ovules 2, pendulous from apex of ovary **ICACINACEAE**12b Ovules 2–8, erect from base of ovary **CELASTRACEAE**

5b Leaves alternate, sometimes all radical:

13a Leaves compound with 3 or more leaflets; trees or shrubs, sometimes climbing:

14a Leaves 2-pinnate; flowers bisexual; fruit winged, indehiscent **FABACEAE**14b Leaves 1-pinnate or 3-foliolate; flowers unisexual; plants polygamous or dioecious; fruit drupaceous **ANACARDIACEAE**

13b Leaves simple or 1-foliolate:

15a Ovary with 1 ovule:

16a Flowers irregular; the inner 2 sepals larger than the others, the lowest (median) petal forming a keel, the upper 2 petals vestigial or absent; fruit long-winged, indehiscent; trees or shrubs, sometimes climbing **POLYGALACEAE**

16b Flowers regular; fruit unwinged, but sometimes surrounded by persistent wing-like sepals:

17a Leaves with stipules; stamens as many as petals; herbs **CARYOPHYLLACEAE**

17b Leaves without stipules:

18a Sepals united into an elongated tube; stamens mostly twice as many as petals, arising on calyx tube; shrubs, sometimes heath-like **THYMELAEACEAE**

18b Sepals free or almost so; calyx sometimes reduced to a rim:

19a Stamens united into a synandrium; leaf blade peltate or subpeltate; woody, dioecious climbers .. **MENISPERMACEAE**

19b Stamens free or almost so; leaf blade not peltate:

20a Plants polygamous or dioecious; stamens 1–10; trees or shrubs **ANACARDIACEAE**20b Plants with bisexual flowers; stamens as many as and opposite petals; woody climbers **OPILIACEAE**

15b Ovary with 2 or more ovules:

21a Anthers opening by 2 upcurving valves; shrubs with 3-partite spines at the nodes; fruit a berry **BERBERIDACEAE**

21b Anthers opening by longitudinal slits; combination of characters not as above:

22a Leaves with stipules:

23a Stamens as many as and opposite petals:

24a Stamens with filaments united into a tube; subshrubs or shrublets with stellate, tufted and simple hairs
 **BYTTNERIOIDEAE—MALVACEAE**24b Stamens with free filaments; scrambling or erect shrubs or trees, glabrous or hairs, if present, not stellate
 **Homalieae (Gerrardina)—SALICACEAE** (in broad sense)

23b Stamens more numerous than petals, free:

25a Petals and stamens perigynous, arising at mouth of calyx tube **ROSACEAE**25b Petals and stamens hypogynous; small trees or shrubs; leaves palmately lobed **COCHLOSPERMACEAE**

22b Leaves without stipules; trees or shrubs:

26a Petals imbricate; stamens as many as and opposite petals; ovules on a free-central or basal placenta **MYRSINACEAE**

26b Petals valvate:

- 27a Ovules 2 per locule, pendulous from apex of ovary; stamens as many as and alternating with petals **ICACINACEAE**
- 27b Ovules 2–5 per locule, pendulous from apex of a central placenta; stamens as many as and opposite petals, or up to twice as many, or reduced to 3 and accompanied by staminodes **OLACACEAE**
- 1b Ovary 2- or more-locular; if carpels \pm free then they are united by their fused styles:
- 28a Stamens opposite to and usually as many as petals:
- 29a Filaments \pm united into a tube or cup, alternating with staminodes; calyx lobes valvate; herbs or shrubs, often with stellate hairs **DOMBEYOIDEAE—MALVACEAE**
- 29b Filaments connate only at base or quite free, not alternating with staminodes or staminodes absent; stellate hairs present or absent:
- 30a Ovary with few to many ovules in each locule; fruit a loculicidal capsule; flowers in mainly terminal panicles; trees or shrubs:
- 31a Small, aromatic trees or shrubs without stellate hairs; stipules rudimentary; flowers usually unisexual by abortion; style 1 **HETEROPYXIDACEAE**
- 31b Herbs, shrublets or undershrubs, frequently stellate-pubescent; stipules often foliaceous, rarely absent; flowers bisexual; styles 5, rarely 1 **BYTTNERIOIDEAE—MALVACEAE**
- 30b Ovary with 1 or 2 ovules in each locule; fruit drupaceous or baccate:
- 32a Inflorescences leaf-opposed; herbaceous or woody plants, often climbing with tendrils; leaves simple (often lobed or divided) or digitate; ovules 2 in each locule; fruit a berry **VITACEAE**
- 32b Inflorescences axillary; trees or shrubs, often spiny, without tendrils; leaves simple, undivided; ovules 1 in each locule; fruit drupaceous **RHAMNACEAE**
- 28b Stamens, at least those of inner whorl, alternating with petals, as many as or more numerous or fewer than petals:
- 33a Leaves compound, with 2 or more leaflets:
- 34a Inflorescences bearing tendrils; climbing shrubs or herbs; leaves pinnate or 2-ternate **SAPINDACEAE**
- 34b Inflorescences without tendrils:
- 35a Herbs; stamens mostly twice as many as petals, sometimes as many as petals:
- 36a Style simple or stigma sessile; leaves mostly opposite, rarely alternate, 2- or 3-foliolate or pinnate **ZYGOPHYLLACEAE**
- 36b Styles 5, rarely fewer; leaves alternate or radical, digitately or pinnately compound **OXALIDACEAE**
- 35b Trees or shrubs, sometimes climbing:
- 37a Anthers 1-theous; leaves digitate, 3–9-foliolate; stamens 10 or more, filaments united below **BOMBACOIDEAE—MALVACEAE**
- 37b Anthers 2-theous; leaves pinnate or 2-pinnate or 2- or 3-foliolate:
- 38a Leaves opposite or subopposite:
- 39a Leaves imparipinnate or 3-foliolate, dotted with pellucid glands, at least at margin; fruit baccate or separating into 2–4 mericarps **RUTACEAE**
- 39b Leaves paripinnate, leaflets without pellucid glands; fruit a compressed capsule with winged seeds ... **PTAEROXYLACEAE**
- 38b Leaves alternate:
- 40a Leaves with lateral or intrapetiolar stipules, imparipinnate; flowers \pm irregular, in racemes; stamens 4 or 5 **MELIANTHACEAE**
- 40b Leaves without stipules, or stipules modified into recurved spines:
- 41a Filaments united into a tube; leaves pinnate or 2-pinnate **MELIACEAE**
- 41b Filaments free or only shortly united at base:
- 42a Leaflets dotted with pellucid glands; leaves pinnate or 3-foliolate **RUTACEAE**
- 42b Leaflets without pellucid glands:
- 43a Ovary with 2 or more ovules in each locule:
- 44a Ovules many in each locule; styles 5; fruit baccate; leaves pinnate **OXALIDACEAE**
- 44b Ovules 2 in each locule:
- 45a Fruit drupaceous; plants resinous **BURSERACEAE**
- 45b Fruit a capsule; carpels separating from a persistent central column; plants not resinous **PTAEROXYLACEAE**
- 43b Ovary with 1 ovule in each locule:
- 46a Styles 3–5, free and separated at base:
- 47a Carpels almost free, joined only at the base; young stems and leaves ferruginous-pubescent or tomentose ... *(Brucea)* **SIMAROUBACEAE**
- 47b Carpels fused except for the styles **ANACARDIACEAE**
- 46b Style or styles central or terminal, not separated at base:
- 48a Fruit a compressed, 2-locular, 2-seeded capsule with carpels separating and eventually suspended from the bipartite axis; ovules on axile placenta; seeds winged **PTAEROXYLACEAE**
- 48b Fruit a drupe or capsule, sometimes bladderly or winged, if separating into carpels suspended from a central axis then carpels 4 or 8; ovules erect, ascending or pendulous:
- 49a Ovules erect or ascending; leaves paripinnate or 2-pinnate or 2- or 3-foliolate **SAPINDACEAE**
- 49b Ovules pendulous:
- 50a Leaves 2-foliolate; branches armed with straight spines **BALANITACEAE**
- 50b Leaves imparipinnate, tufted at ends of branchlets; branches unarmed or with prickles:
- 51a Fruit dry, sharply 4-angled, at length separating into 4 or 8 1-seeded triquetrous cocci suspended from the top of a central carpophore **KIRKIACEAE**

- 51b Fruit a berry or of separate drupaceous mericarps **SIMAROUACEAE**
- 33b Leaves simple or 1-foliolate, sometimes deeply divided:
- 52a Perianth irregular; sepals 3 or 5, the median one extended into a hollow nectariferous spur or sac:
- 53a Leaves basifixed; petals 3; stamens 5, anthers united around ovary; fruit an explosively dehiscent capsule; herbs **BALSAMINACEAE**
- 53b Leaves peltate; petals 5; stamens 4 + 4; fruit dividing into 3 1-seeded fleshy mericarps ***TROPAEOLACEAE**
- 52b Perianth regular or slightly irregular, not spurred:
- 54a Leaves opposite or whorled, not all radical:
- 55a Stamens more than twice as many as petals:
- 56a Leaves with stipules:
- 57a Trees or shrubs; stipules interpetiolar; petals fringed at apex; stamens 15–45, filaments not united into bundles **RHIZOPHORACEAE**
- 57b Herbs; stipules not interpetiolar; petals not fringed; stamens 15, filaments united below into 5 bundles **GERANIACEAE**
- 56b Leaves without stipules; sepals free; stamens and petals hypogynous; filaments irregularly arranged or ± united into bundles; styles 1–5 or absent; leaves usually dotted or streaked with pellucid or opaque glands; trees, shrubs or herbs **CLUSIACEAE**
- 55b Stamens up to twice as many as petals:
- 58a Sepals united below into a tube:
- 59a Petals perigynous, arising at mouth of calyx tube; ovary with many ovules in each locule:
- 60a Anthers opening by apical pores; connective often appendaged below anther; leaves with 3 or more parallel longitudinal nerves; herbs or shrubs **MELASTOMACEAE**
- 60b Anthers opening by longitudinal slits; connective unappendaged; leaves without parallel longitudinal nerves; herbs, shrubs or trees **LYTHRACEAE**
- 59b Petals hypogynous, not arising on calyx tube; ovary with 1–3 ovules per locule:
- 61a Succulent annuals **ZYGOPHYLLACEAE**
- 61b Trees or shrubs:
- 62a Stamens twice as many as petals; leaves with interpetiolar stipules; petals fringed at apex; plants not spiny **RHIZOPHORACEAE**
- 62b Stamens as many as petals; leaves without stipules; petals not fringed; plants spiny **SALVADORACEAE**
- 58b Sepals free or almost so:
- 63a Ovary with 1 ovule in each fertile locule (sometimes 1 or 2 of the locules empty); stamens twice as many as petals; fruit winged; shrubs, often climbing **MALPIGIACEAE**
- 63b Ovary with 2 or more ovules in each locule:
- 64a Leaves lobed or deeply divided; ovary beaked; herbs or shrublets **GERANIACEAE**
- 64b Leaves not lobed or divided; ovary without a stout central axis:
- 65a Styles 3–5:
- 66a Ovary with many ovules in each locule; sepals entire; leaves with stipules **ELATINACEAE**
- 66b Ovary with 2 ovules in each locule; sepals toothed or lobed at apex; leaves without stipules **LINACEAE**
- 65b Style 1:
- 67a Herbs or subshrubs; leaves succulent or glaucous **ZYGOPHYLLACEAE**
- 67b Trees or shrubs, sometimes climbing:
- 68a Stamens 10, twice as many as petals **CTENOLOPHONACEAE**
- 68b Stamens as many as or fewer than petals:
- 69a Stamens as many as petals, alternating with petaloid staminodes; leaves dotted with pellucid glands **RUTACEAE**
- 69b Stamens as many as or fewer than petals, not alternating with staminodes; leaves without translucent glands **CELASTRACEAE**
- 54b Leaves alternate or fascicled, sometimes all radical:
- 70a Ovary with 1 ovule in each fertile locule (sometimes 1 or 2 of the locules empty):
- 71a Flowers unisexual (often by abortion) or plants polygamous:
- 72a Ovary of (1)2–5(6) free carpels; fruit of separate follicles, each with 1 large seed **BROWNLOWIOIDEAE (Christiana)—MALVACEAE**
- 72b Ovary of fused carpels:
- 73a Ovary 2-locular with 1(2) pendulous ovules per locule; stigma large, ± sessile; fruit a 2-valved capsule, each valve prolonged by 2 foliaceous wings **BROWNLOWIOIDEAE (Berrya)—MALVACEAE**
- 73b Combination of characters not as above:
- 74a Leaves with or without stipules; stipules sometimes spiny, especially in succulent species; milky to reddish latex often present; inflorescences basically cymose, sometimes flowers in cyathia (*Euphorbia*); fruit often a 3-lobed capsule dehiscent septically into 3 bivalved cocci, often leaving a ± persistent axis; ovules typically with an obturator; seeds mostly with a micropylar caruncle **EUPHORBIACEAE**
- 74b Leaves without stipules, or stipules small, or one stipule of a pair often placed much higher than the other, never spiny; plants not succulent; latex absent; flowers in racemes, narrow panicles or fascicles; fruit a drupe or capsule, sometimes bladderly or winged; ovules without an obturator; seeds without a caruncle but sometimes with an arilode:

- 75a Stamens 5–24, often 8; disc usually well-developed; fruit a drupe or capsule, sometimes bladdery or winged; seeds often with an arillode; ovules anatropous, hemitropous or campylotropous **SAPINDACEAE**
- 75b Stamens 5, or 10 in 2 whorls of 5, alternately longer and shorter; disc usually small or absent; fruit drupaceous, eventually dehiscent by valves; seeds without an arillode; ovules orthotropous or anatropous **PANDACEAE**
- 71b Flowers bisexual:
- 76a Anthers 1-thealous; stamens many, filaments \pm united into a tube around the style; sepals valvate, with or without an epicalyx; plants often with stellate hairs **MALVACEAE**
- 76b Anthers 2-thealous:
- 77a Styles 2 or more, sometimes fused towards base:
- 78a Herbs or low subshrubs; fruit of 2 hemispherical mericarps, often with a rough surface **MOLLUGINACEAE**
- 78b Trees, shrubs or perennial scramblers; fruit a drupe or separating into 2 or 3 broadly winged mericarps:
- 79a Perennial scramblers, rarely shrubs with medifixed unicellular hairs; fruit separating into 2(3) broadly winged mericarps **MALPIGHIACEAE**
- 79b Trees or shrubs, not scrambling, glabrous; fruit a drupe **ERYTHROXYLACEAE**
- 77b Style 1:
- 80a Herbs or subshrubs; sepals and petals 4; stamens 6, tetradynamous (inner 4 long, outer 2 short); fruit an indehiscent, dehiscent or splitting capsule (silique/silicule) **BRASSICACEAE**
- 80b Trees, shrubs or rhizomatous subshrubs; sepals and petals usually 5; stamens mostly more than 6:
- 81a Petals and stamens perigynous, arising at mouth of calyx tube; ovary fused on one side to calyx tube **CHRYSOBALANACEAE**
- 81b Petals and stamens hypogynous; ovary free from calyx:
- 82a Carpels \pm free:
- 83a Leaves penninerved, mostly glabrous **OCHNACEAE**
- 83b Leaves palmatinerved, with dense stellate hairs **BROWNLOWIOIDEAE—MALVACEAE**
- 82b Carpels fused into a 5-locular ovary:
- 84a Stipules minute; anthers with disjunct thecae containing only 1 pollen sac and attached to lower portion of a thick fleshy, ovate-acuminate connective, dehiscent by detachment **HUMIRIACEAE**
- 84b Stipules large, very long, folded around the terminal bud and leaving a distinct scar around stem; anthers 2-thealous, opening by longitudinal slits **IRVINGIACEAE**
- 70b Ovary with 2 or more ovules in each locule:
- 85a Stamens as many as or fewer than petals:
- 86a Ovules many in each locule; flowers in axillary pedunculate umbels; trees or shrubs **BREXIACEAE**
- 86b Ovules 2 in each locule:
- 87a Ovary 5-locular:
- 88a Petals imbricate; leaves lobed or divided; ovary and fruit beaked; herbs or shrublets **GERANIACEAE**
- 88b Petals contorted; leaves simple, entire; ovary and fruit without a stout central axis:
- 89a Herbs; petals not persistent; styles 5 **LINACEAE**
- 89b Trees or shrubs; petals persistent; style 1 **IXONANTHACEAE**
- 87b Ovary 2–4-locular:
- 90a Petals 2-lobed or 2-fid; fruit a drupe; leaves entire **DICHAPETALACEAE**
- 90b Petals not 2-lobed:
- 91a Flowers unisexual; styles 2 or 3, free or united at base, often lobed or branched **EUPHORBIACEAE**
- 91b Flowers bisexual; style 1 **CELASTRACEAE**
- 85b Stamens more numerous than petals:
- 92a Leaves without stipules, or stipules minute and early caducous:
- 93a Filaments \pm united into a tube **MELIACEAE**
- 93b Filaments free or united only at base:
- 94a Leaves dotted with translucent glands **RUTACEAE**
- 94b Leaves without translucent glands:
- 95a Herbs with tubers or a woody rootstock **OXALIDACEAE**
- 95b Trees, shrubs, or climbers:
- 96a Petals 12–16, valvate in bud, opening irregularly in 6 or 7 lobes free or joined at base; stamens \pm 50 **SCYTROPETALACEAE**
- 96b Petals 4 or 5(6); stamens fewer than 20, or if more, then aggregated into fascicles or clusters:
- 97a Trees or shrubs, secreting resin; bark often peeling or flaking; stamens 8(4), arising on a disc; ovary 2-locular with 2 ovules per locule **BURSERACEAE**
- 97b Trees, shrubs or woody climbers without resin and without peeling bark; stamens 9–many:
- 98a Stamens 9–13, borne at apex of a stout gynophore; ovary 4- or 5-locular with many axile ovules; style 1, 4- or 5-fid at apex **PENTADIPLANDRACEAE**
- 98b Stamens many, aggregated into fascicles or clusters, free or adnate to corolla base; styles 5 or 6, free with papillose stigmas **THEACEAE**
- 92b Leaves with stipules:

- 99a Sepals imbricate; plants without stellate hairs; ovary 5-locular with 2 ovules in each locule:
 100a Petals imbricate; ovary beaked, with a 5-branched style; herbs or shrublets **GERANIACEAE**
 100b Petals contorted; ovary without a stout central axis, with 5 free styles; trees or shrubs, sometimes climbing
 **LINACEAE**
- 99b Sepals (or calyx lobes) valvate; plants often with stellate hairs:
 101a Filaments free or almost so; trees, shrubs or herbs **GREWOIDEAE, HELICTEROIDEAE—MALVACEAE**
 101b Filaments \pm united into a tube or into groups of 2 or 3:
 102a Anthers 2-theous; trees or shrubs **DOMBEYOIDEAE—MALVACEAE**
 102b Anthers 1-theous; herbs, shrubs or sometimes trees **MALVOIDEAE—MALVACEAE**

GROUP 9 (*Placentation axile, basal or apical; ovary superior; petals \pm united*)

- 1a Ovary 1-locular, sometimes septate towards base:
 2a Flowers unisexual; plants dioecious; male flowers with united petals, female flowers with 1–4 free petals; stamens united into a synandrium;
 leaf blades peltate or subpeltate; woody climbers. **MENISPERMACEAE**
- 2b Flowers bisexual; stamens free or with united filaments:
 3a Ovary with 1 ovule:
 4a Flowers irregular, papilionaceous, lowermost 2 petals united and forming a keel; stamens 10, diadelphous: uppermost 1 free, other 9 with
 \pm united filaments; herbs **FABACEAE**
- 4b Flowers regular; stamens not diadelphous:
 5a Sepals 2; petals united only near base; \pm succulent twining herbs or stout shrubs:
 6a Leaves alternate; perennials with twining stems **BASELLACEAE**
 6b Leaves opposite; succulent shrubs with stout, sometimes waxy branches **PORTULACACEAE**
- 5b Sepals more than 2:
 7a Stamens arising on elongated calyx tube, usually twice as many as calyx lobes; corolla ring-like, arising at mouth of calyx tube; ovule
 pendulous from apex of ovary; shrubs, sometimes climbing **THYMELAEACEAE**
 7b Stamens not arising on calyx, as many as calyx lobes; corolla 4- or 5-lobed, not ring-like; ovule arising from base of ovary:
 8a Leaves alternate; stamens opposite petals; calyx covered with stalked glands; herbs or shrubs, sometimes climbing .. **PLUMBAGINACEAE**
 8b Leaves opposite; stamens alternating with petals; calyx without stalked glands; shrubs or trees **SALVADORACEAE**
- 3b Ovary with 2 or more ovules:
 9a Stamens fewer than petals; flowers \pm irregular; herbs, often aquatic:
 10a Stamens 2; corolla strongly irregular, tube spurred; leaves undivided or much divided and often bearing insectivorous bladders
 **LENTIBULARIACEAE**
 10b Stamens 4; corolla only slightly irregular, tube not spurred; leaves undivided, without bladders **SCROPHULARIACEAE**
- 9b Stamens as many as petals; flowers regular or almost so:
 11a Stamens opposite petals:
 12a Trees, shrubs or lianes; fruit indehiscent, usually 1-seeded; leaves alternate **MYRSINACEAE**
 12b Herbs; fruit a many-seeded circumscissile or 5-valved capsule, or sometimes 1-seeded and indehiscent; leaves opposite or
 alternate **PRIMULACEAE**
- 11b Stamens alternating with petals; trees or shrubs:
 13a Leaves opposite:
 14a Shrubs or woody climbers with milky sap **APOCYNACEAE**
 14b Trees or shrubs, sometimes mangroves, sometimes leaves with 5(7) major veins from near the base:
 15a Leaves with 1 major vein from the base; mangroves **AVICENNIACEAE**
 15b Leaves with 5(7) major veins from near the base; savanna trees **STRYCHNACEAE**
- 13b Leaves alternate; stamens 5 or 10 or more; ovules 2 or 10 or more:
 16a Trees, shrubs or lianas; sepals (3)4 or 5; stamens 5; fruit a drupe **ICACINACEAE**
 16b Subshrubs or perennial herbs, often with fleshy leaves; sepals 2; stamens 10 or more; fruit a chartaceous capsule
 **PORTULACACEAE**
- 1b Ovary 2- or more-locular:
 17a Petals 10 or more:
 18a Styles/stigmas 5; fruit a 5-valved capsule; herbs with fleshy leaves **MESEMBRYANTHEMACEAE**
 18b Style 1; fruit a berry; trees or shrubs, sometimes climbing:
 19a Stamens \pm 50; petals (probably petaloid corona lobes) opening irregularly **SCYTOPETALACEAE**
 19b Stamens mostly fewer than 20; petals opening regularly in 1–3 whorls:
 20a Petals in 2 or 3 whorls, imbricate; stamens twice as many as inner petals, or as many as and opposite inner petals and alternating with
 staminodes; ovary with 1 ovule in each locule; leaves alternate **SAPOTACEAE**
 20b Petals in 1 whorl, imbricate; stamens 2; ovary with 4 or 5 ovules in each locule **OLEACEAE**
- 17b Petals fewer than 10:
 21a Stamens more numerous than petals:
 22a Leaves with stipules, often digitate or palmately lobed; flowers unisexual; trees, shrubs or herbs **EUPHORBIACEAE**
 22b Leaves without stipules, or stipules minute and early caducous:

- 23a Flowers irregular, lowest (median) petal forming a keel; filaments united into a sheath split on upper side; ovary 2-locular with 1 ovule in each locule; herbs or shrubs **POLYGALACEAE**
- 23b Flowers regular; filaments not united into a sheath but sometimes united at base; trees or shrubs:
- 24a Ovary with 1 or 2 ovules in each locule; fruit indehiscent, baccate; flowers bisexual or unisexual **EBENACEAE**
- 24b Ovary with several or many ovules in each locule; fruit a loculicidal capsule or a drupe:
- 25a Stamens 10 or fewer; plants often heath-like **ERICACEAE**
- 25b Stamens \pm 50; glabrous trees **SCYTOPETALACEAE**
- 21b Stamens as many as or fewer than petals:
- 26a Stamens fewer than petals: 2–4:
- 27a Ovary with more than 4 ovules in each locule; flowers mostly irregular:
- 28a Leaves pinnate, opposite or ternate; stamens 4; fruit a loculicidal capsule with winged seeds; trees or shrubs, sometimes climbing **BIGNONIACEAE**
- 28b Leaves simple, sometimes deeply divided or reduced to scales:
- 29a Ovary completely or incompletely 4-chambered, each of 2 original locules becoming divided into 2 by a false septum; stamens 4; herbs or sometimes shrubs with mucilaginous glands **PEDALIACEAE**
- 29b Ovary 2-locular, locules not becoming divided by false septa:
- 30a Ovules arranged in more than 2 series on each placenta; stamens 4 or 2; fruit a capsule or sometimes a berry, seeds not borne on hardened hook-like funicles; leaves alternate or opposite or whorled, sometimes reduced to scales; herbs or shrubs or sometimes trees **SCROPHULARIACEAE**
- 30b Ovules arranged in 1 or 2 series on each placenta:
- 31a Fruit a club-shaped to ellipsoidal, loculicidally, often explosively dehiscent capsule, with seeds mostly borne on hard, hygroscopic, hook-like funicles; leaves opposite, mostly entire; herbs, shrubs or small trees **ACANTHACEAE**
- 31b Fruit indehiscent or tardily dehiscent, armed with horns bearing recurved spines; flowers irregular, medium-sized, variously coloured, adaxially often gibbous, usually solitary, axillary; herbs, rarely shrubs or small trees **PEDALIACEAE**
- 27b Ovary with 1–4 ovules in each locule:
- 32a Stamens 3; peduncles adnate to petioles of subtending leaves; trees or shrubs with alternate leaves **DICHAPETALACEAE**
- 32b Stamens 4 or 2; peduncles not adnate to leaves:
- 33a Perianth regular; stamens 2; leaves opposite or sometimes ternate or alternate; trees or shrubs, sometimes climbing ... **OLEACEAE**
- 33b Perianth irregular:
- 34a Ovary \pm deeply 4-lobed, style gynobasic; fruit separating into 4 nutlets (or fewer by abortion); leaves simple, opposite or whorled or sometimes alternate; herbs or shrubs, often aromatic **LAMIACEAE**
- 34b Ovary not deeply 4-lobed, style not gynobasic:
- 35a Fruit a capsule, loculicidally dehiscent or sometimes failing to dehisce; seeds often borne on hardened, hook-like funicles; ovary 2-locular with 2–4 ovules in each locule; herbs or shrubs with opposite, simple leaves .. **ACANTHACEAE**
- 35b Fruit separating into 2 or more pyrenes or cocci, or a capsule, but then seeds not borne on hardened hook-like funicles:
- 36a Flowers solitary, axillary; fruit indehiscent, armed with 2 or 4 spines, or longitudinally 4-winged; stamens 4; leaves opposite or subopposite, often toothed or pinnately lobed; herbs with mucilaginous glands **PEDALIACEAE**
- 36b Flowers grouped in inflorescences; fruit without spines or wings:
- 37a Anthers 1-theous; leaves mostly alternate, simple, narrow; ovary 2-locular with 1 apical, pendulous ovule in each locule; herbs or shrubs **SCROPHULARIACEAE**
- 37b Anthers 2-theous; sometimes confluent; ovary 2–4(8)-locular with 1 basal or axile ovule in each locule; leaves opposite or whorled, simple, sometimes lobed or dissected **VERBENACEAE**
- 26b Stamens as many as petals: 4 or more:
- 38a Leaves absent or reduced to scales:
- 39a Slender, twining, parasitic plants; ovary with 2 ovules in each locule; fruit a capsule; corolla with or without infrastaminal scales (*Cuscuta*) **CONVOLVULACEAE**
- 39b Shrubs or succulent plants, not parasitic; ovary with many ovules in each locule; fruit formed of 2 separate follicular carpels (or 1 by abortion); flowers with corona **APOCYNACEAE**
- 38b Leaves present, well-developed:
- 40a Stamens opposite petals, sometimes with staminodes; trees or shrubs with alternate leaves:
- 41a Leaves simple, entire; corolla lobes imbricate; stamens sometimes alternating with staminodes **SAPOTACEAE**
- 41b Leaves 2-pinnate; corolla lobes valvate; stamens not accompanied by staminodes, filaments united into a tube **LEEACEAE**
- 40b Stamens alternating with petals, sometimes partly connate:
- 42a Leaves opposite or whorled, sometimes in opposite or subopposite fascicles on small cushions, not all radical:
- 43a Stamens hypogynous, not arising on corolla; anthers opening by apical slits; heath-like shrubs **ERICACEAE**
- 43b Stamens arising on corolla tube or variously joined with gynoecium:
- 44a Petals imbricate in bud:
- 45a Ovary with 1 or 2 ovules in each locule; fruit drupaceous, or separating into pyrenes or nutlets, or a loculicidal capsule:
- 46a Petals and stamens 4; herbs, shrubs or trees **VERBENACEAE**
- 46b Petals and stamens 5:

- 47a Herbs, often with bulbous-based hairs; fruit drupaceous or separating into pyrenes or nutlets; flowers all similar **BORAGINACEAE**
- 47b Shrubs, undershrubs or lianes, glabrous or with simple hairs; fruit a loculicidal capsule; flowers dimorphic ...
..... **GELSEMIACEAE**
- 45b Ovary with several to many ovules in each locule; fruit a septicidal capsule, sometimes a berry:
- 48a Petals and stamens 5 or more; leaves pinnately compound, or simple and then rigid spiny shrubs with solitary or paired flowers **BIGNONIACEAE**
- 48b Petals and stamens 4; herbs, subshrubs, shrubs or trees, not spiny, and if shrubs, flowers not solitary or paired:
- 49a Herbs; flowers solitary or paired in leaf axils **SCROPHULARIACEAE**
- 49b Trees, shrubs or subshrubs; flowers in cymes, racemes or panicles **BUDDLEJACEAE**
- 44b Petals contorted or valvate:
- 50a Petals valvate; leaves usually with 3 major veins from base; fruit a berry, often large, globose and with a woody rind **STRYCHNACEAE**
- 50b Petals contorted:
- 51a Herbs with septicidal capsules or rarely trees with berries **GENTIANACEAE**
- 51b Herbs, often succulent, shrubs or trees, often with milky latex; flowers often with corona; fruit mostly a pair of follicular mericarps **APOCYNACEAE**
- 42b Leaves (at least lower ones) alternate, sometimes all radical:
- 52a Leaves all radical; flowers small, in pedunculate spikes or heads; fruit a circumscissile capsule; herbs **PLANTAGINACEAE**
- 52b Leaves not all radical:
- 53a Ovary with more than 2 ovules in each locule:
- 54a Petals contorted; fruit formed of 2 follicular mericarps; shrubs or trees **APOCYNACEAE**
- 54b Petals not contorted; fruit a capsule or berry:
- 55a Styles 2 or 3; petals imbricate; fruit a capsule; herbs **HYDROPHYLLACEAE**
- 55b Style 1:
- 56a Petals plicate or valvate; herbs, shrubs or trees **SOLANACEAE**
- 56b Petals imbricate:
- 57a Fruit a capsule with winged seeds; leaves simple or 3-foliolate; spiny shrubs **BIGNONIACEAE**
- 57b Fruit a berry or capsule, seeds unwinged; leaves simple; herbs or spiny shrubs **SOLANACEAE**
- 53b Ovary with 1 or 2 ovules in each locule:
- 58a Filaments united into a sheath split on upper side; flowers irregular, lowest (median) corolla lobe forming a keel; fruit drupaceous; shrubs or trees **POLYGALACEAE**
- 58b Filaments not united into a sheath:
- 59a Corolla tube split down front, with 4 lobes; anthers 1-theous; ovary 2-locular with 1 apical, pendulous ovule in each locule; herbs or shrublets with spicate flowers **SCROPHULARIACEAE**
- 59b Corolla tube not split; anthers 2-theous:
- 60a Style absent; stigma sessile; flowers unisexual; fruit a globose berry **AQUIFOLIACEAE**
- 60b Style(s) present, terminal or gynobasic; flowers bisexual; fruit a schizocarp or drupaceous or a capsule, rarely indehiscent:
- 61a Fruit a schizocarp of 4 (rarely 2) nutlets, or drupaceous with 4 (rarely 2) 1-seeded stones; petals imbricate or contorted in bud **BORAGINACEAE**
- 61b Fruit a capsule or indehiscent; petals convolute, folded and valvate in bud; plants often twining or trailing **CONVOLVULACEAE**

GROUP 10 (*Placentation axile, basal or apical; ovary inferior; petals absent*)

- 1a Parasitic plants: either low, ± fleshy, ± leafless and growing on roots of woody plants, or shrublets growing on trees or shrubs:
- 2a Shrubs growing on other trees or shrubs **VISCACEAE**
- 2b Low, ± fleshy, ± leafless root parasites:
- 3a Flowers unisexual, in many-flowered inflorescences; leaves scale-like; ovule 1 **BALANOPHORACEAE**
- 3b Flowers usually bisexual, solitary, with a tubular 3- or 4(5)-lobed perianth resembling a fungus **HYDNORACEAE**
- 1b Plants not parasitic:
- 4a Ovary 2- or more-locular:
- 5a Flowers unisexual, in heads, cymes or panicles; leaves with stipules:
- 6a Flowers in heads; stamens as many as sepals; ovary with 1 ovule in each locule; trees or shrubs with entire leaves **HAMAMELIDACEAE**
- 6b Flowers in cymes or panicles; stamens many; ovary with very many ovules in each locule; sepals petaloid; herbs, sometimes epiphytic, with alternate, often unequal-sided leaves **BEGONIACEAE**
- 5b Flowers bisexual, often solitary, less often in fascicles or clusters, cymes or rarely in spikes; leaves without stipules:
- 7a Leaves opposite; flowers solitary and subsessile in axils of leaves; herbs **ONAGRACEAE**
- 7b Leaves alternate:
- 8a Trees (mangroves); stamens and staminodes very many, the outer series of staminodes fused and resembling a corolla **LECYTHIDACEAE**
- 8b Herbs or shrubs; stamens, if many, without fused staminodes:
- 9a Perianth fused into an S-shaped to ± straight tube; usually twining or scrambling herbs or shrubs; fruit a capsule

- ARISTOLOCHIACEAE
- 9b Perianth members free or fused only in the lower half; fruit a nut, often winged or spiny AIZOACEAE
- 4b Ovary 1-locular:
- 10a Ovules 2 or more in the ovary:
- 11a Stamens twice as many as calyx lobes; trees, shrubs or scramblers; flowers in racemes, spikes or heads; fruit indehiscent, often with 2–5 longitudinal wings COMBRETACEAE
- 11b Stamens as many as calyx lobes:
- 12a Ovules 2–4, pendulous from a free-central placenta; style 1 with an entire or divided stigma; flowers solitary or in cymes or racemes, bisexual or unisexual; herbs or shrubs, often parasitic on roots and sometimes with reduced leaves SANTALACEAE
- 12b Ovules 4, pendulous from apex of ovary; styles 4; flowers clustered in axils of leaves, unisexual or plants polygamous; herbs, not parasitic HALORAGACEAE
- 10b Ovule 1 in the ovary:
- 13a Herbs with large basal, long-petiolate, toothed, kidney-shaped leaves; flowers small, paniculate-spicate GUNNERACEAE
- 13b Trees, shrubs or subshrubs:
- 14a Leaves opposite; perianth tube deeply urn-shaped; anthers opening by 2 valves LAURACEAE
- 14b Leaves mostly alternate:
- 15a Flowers unisexual, small, enclosed in a syconium or ‘fig’, or implanted on a flat to top-shaped receptacle, in globose heads or catkins; often with milky or watery latex MORACEAE
- 15b Flowers bisexual or unisexual, cymose in axils of upper leaves; latex absent; fruit a bony nut with long wings HERNANDIACEAE

GROUP 11 (*Placentation axile, basal or apical; ovary inferior; petals free*)

- 1a Parasitic shrubs growing on other shrubs or trees; ovules scarcely distinguishable from surrounding tissue of ovary; calyx truncate or obsolete; stamens as many as and opposite petals and arising on them; leaves simple, entire, opposite or alternate, sometimes reduced to scales LORANTHACEAE
- 1b Plants not parasitic; ovule or ovules clearly distinguishable within ovary:
- 2a Ovary 1-locular:
- 3a Trees or shrubs, sometimes climbing; style 1, unbranched:
- 4a Leaves alternate or scattered, ± ericoid; stamens 4 or 5; sepals, petals and stamens 4; flowers solitary, axillary CELASTRACEAE
- 4b Leaves opposite, rarely alternate but then stamens more than 5, flat, sometimes with 3(5) main veins from base:
- 5a Leaves with 3(5) main veins from base; young branches usually 4-angled; fruit a ± globose berry; ovules 2–12 on central placenta MELASTOMATACEAE
- 5b Leaves with 1 main vein from base; fruit usually indehiscent, dry or sometimes fleshy, often variously winged or ridged; ovules usually 2, pendulous COMBRETACEAE
- 3b Herbs or subshrubs; styles or style branches 2–6:
- 6a Ovules many on basal placenta; sepals 2, often deciduous; fruit a circumscissile capsule PORTULACACEAE
- 6b Ovule or ovules pendulous from apex of ovary or on pendulous, apical placentas; sepals or calyx lobes 2–5; fruit not circumscissile:
- 7a Ovules many on pendulous placentas; fruit a capsule dehiscing at apex; leaves opposite; flowers bisexual, in axillary pairs; petals and stamens 5 VAHLIACEAE
- 7b Ovules 1–4, pendulous from apex of ovary; fruit indehiscent; leaves alternate or opposite, sometimes all radical; flowers bisexual or unisexual, paniculate-spicate or in axillary clusters:
- 8a Leaves small, sessile; flowers in axillary fascicles HALORAGACEAE
- 8b Leaves large, on long petioles; flowers in terminal heads or compound spikes GUNNERACEAE
- 2b Ovary 2- or more-locular:
- 9a Ovule 1 in each locule:
- 10a Stamens twice as many as petals:
- 11a Trees, shrubs or subshrubs; petals 5 ANISOPHYLLEACEAE
- 11b Herbs; petals 2–4; stamens 4–8; ovary 1–4-locular:
- 12a Flowers small to minute, usually unisexual; aquatics or marsh plants HALORAGACEAE
- 12b Flowers conspicuous with 4 usually sharply clawed petals ONAGRACEAE
- 10b Stamens as many as petals:
- 13a Stamens opposite petals; shrubs, often climbing with tendrils; fruit often separating into cocci, sometimes winged ... RHAMNACEAE
- 13b Stamens alternating with petals; plants without tendrils:
- 14a Flowers solitary in axils of leaves; floating aquatic herbs; leaves alternate, rosulate, with ± inflated petiole; fruit large, indehiscent, with hard endocarp and armed with 2 or 4 horns TRAPACEAE
- 14b Flowers grouped in inflorescences; plants not aquatic:
- 15a Fruit separating into 2 cocci; herbs, sometimes arborescent; flowers in simple or compound umbels, sometimes capitate; leaves often much divided or compound APIACEAE
- 15b Fruit drupaceous or capsular, not separating into cocci; trees or shrubs:
- 16a Leaves pinnate or digitate or palmately divided; flowers in umbels or racemes or spikes; fruit drupaceous ... ARALIACEAE
- 16b Leaves simple, undivided:
- 17a Petals and stamens 4; fruit a drupe; leaves opposite, entire or toothed; flowers bisexual or unisexual, in panicles or umbel-like cymes CORNACEAE
- 17b Petals and stamens 5; fruit a capsule; trees or shrubs HAMAMELIDACEAE

9b Ovules 2 or more in each locule:

18a Leaves alternate:

19a Leaves with stipules, often unequal-sided; flowers unisexual; plants monoecious; stamens many; ovules very many in each locule; herbs, sometimes epiphytic **BEGONIACEAE**

19b Leaves without stipules:

20a Style absent; stigmas as many as locules, subulate to filiform; leaves \pm succulent **MESEMBRYANTHEMACEAE**

20b Styles 1 or 2:

21a Styles 2; flowers unisexual or both bisexual and unisexual on same plant, in axillary panicles; stamens as many as petals; ovary 2-locular; shrubs **ESCALLONIACEAE**

21b Style 1, with an entire or lobed stigma; flowers bisexual or sometimes both bisexual and unisexual on same plant:

22a Fruit a drupe; petals 2-fid or 2-lobed; leaves entire **DICHAPETALACEAE**

22b Fruit a capsule:

23a Stamens as many or twice as many as petals:

24a Herbs or shrubs, sometimes aquatic; flowers bisexual **ONAGRACEAE**

24b Shrubs or shrublets, dioecious; flowers small, male corymbose, female solitary **MONTINIACEAE**

23b Stamens many, more than twice as many as petals; fruit a berry or drupe:

25a Flowers solitary or paired in axils of leaves; ovary 2-locular; leaves gland-dotted; shrublets **MYRTACEAE**

25b Flowers in terminal racemes; ovary 4-locular; leaves not gland-dotted; mangroves **LECYTHIDACEAE**

18b Leaves opposite:

26a Leaves fleshy and succulent **MESEMBRYANTHEMACEAE**

26b Leaves not succulent:

27a Stamens as many as petals; petals alternating with incurved scales; trees or shrubs **OLINIACEAE**

27b Stamens twice as many as petals or more numerous; petals not alternating with scales:

28a Stamens many, more than twice as many as petals; trees or shrubs with gland-dotted leaves; stipules absent or very small **MYRTACEAE**

28b Stamens twice as many as petals, if more, then interpetiolar stipules present or a scar line if they have fallen:

29a Leaves with interpetiolar stipules; ovules 2 in each locule; viviparous mangroves, or forest trees or shrubs **RHIZOPHORACEAE**

29b Leaves without stipules or stipules much reduced; ovules many in each locule; plants not viviparous:

30a Anthers opening by an apical pore; connective often appendaged below anther; leaves with 3 or more parallel, longitudinal nerves; seeds without tuft of hairs; herbs or shrubs or small trees **MELASTOMATACEAE**

30b Anthers opening by longitudinal slits; connective unappendaged; leaves without parallel, longitudinal nerves; seeds often with an apical tuft of hairs; herbs **ONAGRACEAE**

GROUP 12 (*Placentation axile, basal or apical; ovary inferior; petals \pm united*)

1a Parasitic shrubs growing on other shrubs or trees; ovules scarcely distinguishable from surrounding tissue of ovary; calyx truncate or shortly lobed; stamens as many as and opposite corolla lobes and arising on them; leaves simple, entire, opposite or alternate, sometimes ternate **LORANTHACEAE**

1b Plants not parasitic; ovule or ovules clearly distinguishable within ovary:

2a Ovary 1-locular:

3a Ovule 1; flowers regular or irregular, in involucre heads; fruit indehiscent, often crowned by persistent calyx forming a pappus of bristles or scales:

4a Anthers united into tube surrounding style; ovule erect from base of ovary; herbs, shrubs or trees; corolla of outer (ray) flowers often differing from that of inner flowers **ASTERACEAE**

4b Anthers free; ovule pendulous from apex of ovary; herbs with opposite leaves **DIPSACACEAE**

3b Ovules many; flowers regular, not in involucre heads:

5a Calyx composed of 2 often deciduous sepals; fruit a circumscissile capsule; stamens as many as and alternating with corolla lobes or more numerous; herbs **PORTULACACEAE**

5b Calyx 4- or 5-lobed; fruit not circumscissile; stamens as many as and opposite corolla lobes:

6a Trees or shrubs; flowers in axillary panicles or racemes; fruit indehiscent, dry or fleshy **MAESACEAE**

6b Herbs; flowers in terminal racemes; fruit a 5-valved capsule **PRIMULACEAE**

2b Ovary 2- or more-locular (sometimes 3-locular with 1 fertile locule and 2 empty locules):

7a Petals united into a deciduous mass (calyptra); stamens very many; trees or shrubs with gland-dotted leaves **MYRTACEAE**

7b Petals more or less united into a tube, not into a deciduous mass; stamens not more than twice as many as corolla lobes:

8a Ovary 3-locular with 2 empty locules, fertile locule with 1 apical, pendulous ovule; stamens 3; fruit indehiscent, often crowned by persistent calyx forming feathery pappus; herbs with opposite leaves **VALERIANACEAE**

8b Ovary 2- or more-locular, usually without empty locules:

9a Trailing or climbing herbs or shrubs often with tendrils; flowers unisexual; stamens 3–5, anthers sometimes curved or flexuous or folded; leaves often palmately or pedately lobed or deeply divided **CUCURBITACEAE**

9b Plants without tendrils; flowers bisexual or sometimes unisexual:

10a Leaves opposite or whorled, with interpetiolar or intrapetiolar (sometimes leaf-like) stipules and entire margin; trees, shrubs or herbs, sometimes climbing **RUBIACEAE**

10b Leaves alternate or opposite, or spirally imbricate, without stipules, sometimes reduced to scales:

- 11a Stamens indefinite; leaves fleshy **MESEMBRYANTHEMACEAE**
- 11b Stamens definite; leaves rarely succulent:
- 12a Stamens twice as many as corolla lobes; anthers opening by apical pores; flowers in axillary racemes; trees or shrubs with alternate leaves **ERICACEAE**
- 12b Stamens as many as corolla lobes; anthers opening by longitudinal slits:
- 13a Fruit a drupe:
- 14a Ovary with 1 ovule in each locule; flowers irregular, corolla tube split down back; maritime shrubs or undershrubs ...
..... **GOODENIACEAE**
- 14b Ovary with 2 or more ovules in each locule; flowers \pm regular; petals bifid or bilobed **DICHAPETALACEAE**
- 13b Fruit a capsule:
- 15a Corolla lobes imbricate; capsule circumscissile; flowers regular, in terminal spikes; anthers free; hydrophytes
..... **SPHENOCLEACEAE**
- 15b Corolla lobes valvate; capsule dehiscent by valves; flowers regular or irregular with 1- or 2-lipped corolla; anthers free or cohering in a tube around the style **CAMPANULACEAE**

KEY TO MONOCOTYLEDONS (pp. 375–458)

- 1a Flowers white or otherwise brightly coloured; perianth wholly or partly petal-like:
- 2a Ovary superior **Group 1** (below)
- 2b Ovary inferior or half-inferior **Group 2** (p. 24)
- 1b Flowers with perianth absent or papery, glumaceous to hyaline or sometimes herbaceous, or reduced to hairs or scales:
- 3a Aquatic herbs, free-floating or submerged **Group 3** (p. 24)
- 3b Land plants, sometimes rooting in water:
- 4a Flowers (florets) arranged in small spikes (spikelets) subtended or enclosed by bracts; grasses or grass-like plants **Group 4** (p. 25)
- 4b Flowers not arranged in spikelets **Group 5** (p. 25)

GROUP 1 (*Flowers white or otherwise brightly coloured; perianth wholly or partly petal-like; ovary superior*)

- 1a Aquatic or marsh herbs:
- 2a Perianth of 6 petal-like tepals in 2 whorls, blue, white or yellow; gynoecium with an ovary of 3 fused carpels **PONTEDERIACEAE**
- 2b Perianth of 3 coloured sepals or tepals, often accompanied by 3 herbaceous sepals; gynoecium composed of either 2–many \pm free carpels or of 3 fused carpels forming a 1-locular ovary:
- 3a Flowers solitary on long axillary pedicels; gynoecium with a 1-locular ovary of 3 fused carpels **MAYACACEAE**
- 3b Flowers whorled or in simple or 2-branched spikes or in simple to compound umbels; gynoecium of 2–many \pm free carpels:
- 4a Flowers in a simple or 2-branched spike; perianth in a single whorl of 1–3 white to pink tepals **APONOGETONACEAE**
- 4b Flowers whorled or in simple or compound umbels; plants often with white sap:
- 5a Carpels each with 1 basal ovule; fruit of 3–many achenes **ALISMACEAE**
- 5b Carpels each with many ovules on a parietal/marginal placenta; fruit a head of follicles **LIMNOCHARITACEAE**
- 1b Land plants, sometimes rooting in water:
- 6a Perianth composed of separate calyx and corolla, the calyx usually herbaceous:
- 7a Style simple; ovary 2- or 3-locular; flowers in open to congested cymes, with conspicuous corolla often blue or yellow, often subtended by folded or boat-shaped bracts **COMMELINACEAE**
- 7a Style branched; ovary 1–3-locular; flowers small, crowded in bracteate heads or spikes on long, leafless peduncles:
- 8a Flowers unisexual; corolla inconspicuous to minute; ovary 3- or 2-locular **ERIOCAULACEAE**
- 8b Flowers bisexual; petals mostly yellow to white; ovary 1-locular **XYRIDACEAE**
- 6b Perianth composed of similar or subsimilar tepals, all petal-like:
- 9a Anthers dehiscent by an apical pore, often unequal; filaments short, without a swelling below the anther, arising at mouth of perianth tube; rootstock a corm **TECOPHILAEACEAE**
- 9b Anthers dehiscent by longitudinal slits (these rarely very short but then plants rhizomatous and filaments with a swelling below the anther); rootstock a rhizome, bulb or tuber:
- 10a Fruit a fleshy berry or drupe:
- 11a Leaves with 2 basal tendrils; flowers unisexual; plants dioecious **SMLACACEAE**
- 11b Leaves without basal tendrils; flowers bisexual:
- 12a Leaf tips narrowing into a coiled tendril **FLAGELLARIACEAE**
- 12b Leaf tips not as above:
- 13a Flowers longer than 20 mm, tubular below, with exerted stamens, crowded in dense racemes or panicles; leaves large, tough and crowded; plants rhizomatous or tree-like **DRACAENACEAE**
- 13b Flowers up to 10 mm long, in axillary or terminal racemes, panicles or cymes; plants herbaceous, shrubby or scandent:
- 14a Leaves reduced to scales with a spiny or soft spur; cladodes needle-shaped or leaf-like and without distinct cross-connections between parallel veins **ASPARAGACEAE** (in narrow sense)
- 14b Leaves developed, with many prominent parallel veins, often with distinct cross-connections:
- 15a Tepals fused into a short broad tube; scandent climbers or subshrubs; leaves not sheathing at base, not equitant
..... (Luzuriagaceae) **BEHNIACEAE**

- 15b Tepals free, spreading; filaments with a swelling below the anther; stem erect, usually unbranched; leaves sheathing at base and \pm equitant **HEMEROCALLIDACEAE**
- 10b Fruit a capsule:
- 16a Flowers in umbels subtended by 2 spatheaceous bracts and borne on naked peduncles; plants usually smelling of onion or garlic; rootstock a bulb or rhizome **ALLIACEAE**
- 16b Flowers in spikes or racemes:
- 17a Rootstock a bulb; flowers borne on naked peduncles **HYACINTHACEAE**
- 17b Rootstock a rhizome, corm or tuber:
- 18a Seeds woolly; flowering stems leafless except for a clasping basal leafy bract; leaves petiolate, often absent at flowering; rootstock a tuber (Convallariaceae in part) **ERIOSPERMACEAE**
- 18b Seeds glabrous; flowering stems leafy:
- 19a Rootstock a corm, rarely a tuber; seeds brown; flowers usually opposite the bracts **COLCHICACEAE**
- 19b Rootstock a rhizome, sometimes short and with swollen roots; seeds black; flowers in axils of bracts:
- 20a Flowers borne singly in axils of bracts **ASPHODELACEAE**
- 20b Flowers more than 1 in axils of bracts (including Hemerocallidaceae in part) **ANTHERICACEAE**
- GROUP 2** (*Flowers white or otherwise brightly coloured; perianth wholly or partly petal-like; ovary inferior or half-inferior*)
- 1a Submerged aquatics rooting from a rhizome; flowers mostly unisexual, submerged or floating **HYDROCHARITACEAE**
- 1b Terrestrial plants or emergent aquatics, but then rootstock cormous and stamens 6:
- 2a Fertile stamens 5(6) or 1, but then supported by and not fused to the style; leaves pseudopetiolate with a broad base, midrib prominent and secondary veins pinnate-parallel:
- 3a Fertile stamen 1:
- 4a Outer tepals/sepals free; anther 1-theous; ovary 1–3-locular with 1 ovule in each fertile locule **MARANTACEAE**
- 4b Outer tepals/sepals united into a tube; anther 2-theous; ovary 2- or 3-locular, usually with many ovules per locule:
- 5a Leaves distichous, usually with open sheaths; aerial parts aromatic **ZINGIBERACEAE**
- 5b Leaves spirally arranged, with closed sheaths; aerial parts not aromatic **COSTACEAE**
- 3b Fertile stamens 5(6):
- 6a Flowers unisexual, upper 5 tepals fused below; leaves spirally arranged; stems not woody, drying after fruiting, sometimes suckering; fruit a banana with seeds embedded in pith **MUSACEAE**
- 6b Flowers bisexual, lateral inner tepals fused and enclosing style and stamens; leaves distichous; stems and rootstock perennial; seeds pea-like with a tuft of hairs **STRELITZIACEAE**
- 2b Fertile stamens 3(4) or 1, but then fused to the style into a complex columnar structure; leaf venation never pinnate-parallel:
- 7a Stamen 1, united with style into a column (gynostemium); pollen agglutinated into masses (pollinia); upper or lower median tepal often elaborated and spurred **ORCHIDACEAE**
- 7b Stamens 3(4) or 6; pollen not agglutinated into masses:
- 8a Flowers unisexual, in spikes or racemes; climbers with \pm heart-shaped leaves **DIOSCOREACEAE**
- 8b Flowers bisexual:
- 9a Leaves deeply divided with pinnatipartite segments, radical; flowers in bracteate umbels, the outer bracts broad, the inner long and thread-like; herbs with a tuberous rootstock **TACCACEAE**
- 9b Leaves simple and undivided or sometimes absent:
- 10a Stamens 3, opposite outer tepals; leaves mostly unifacial; rootstock a corm or rhizome **IRIDACEAE**
- 10b Stamens 6 or 3, but then opposite inner tepals:
- 11a Inflorescence apparently an umbel (sometimes 1-flowered), subtended by 1 or more spatheaceous bracts and borne on a naked scape; rootstock a bulb or rhizome **AMARYLLIDACEAE**
- 11b Inflorescence a corymb, raceme, panicle, cyme or 1-flowered, not subtended by spatheaceous bracts; rootstock a corm or rhizome (rarely reduced):
- 12a Small saprophytic herbs with a few narrow basal leaves, or leaves scale-like **BURMANNIACEAE**
- 12b Photosynthetic plants with well-developed leaves:
- 13a Robust, rosulate plants with tree-like inflorescences and large, spine-tipped, leathery or succulent leaves persisting for several years ***AGAVACEAE**
- 13b Smaller plants, often coarsely hairy; leaves never spine-tipped:
- 14a Flowers many, in helicoid cymes borne on bracteate stalks; ovules 1 or 2 per locule:
- 14b Flowers mostly solitary or few borne on leafless scapes or pedicels; ovules many per locule:
- 15a Shrublets or short-stemmed perennials; leaves fibrous, abscising below, persistent bases stiffly fibrous and closely imbricate; flowers solitary, purple to mauve or white, with septal nectaries; seeds white to yellowish **VELLOZIACEAE**
- 15b Acaulescent perennials; leaves softer, decaying irregularly, bases loosely fibrous and not regularly imbricate; flowers 1 to many, yellow, white, pink to red, without nectaries; seeds black **HYPOXIDACEAE**

GROUP 3 (*Aquatic herbs, free-floating or submerged (flowers sometimes emergent); perianth absent or cupular or scale-like to well-developed*)

- 1a Plants floating freely on the surface, though sometimes attached to the substrate in very shallow water:

- 2a Small, ± disc-shaped to globular annuals not differentiated into stems and leaves; flowers borne in pouches or sheaths (including Lemnaceae) **ARACEAE**
- 2b Rosette-forming, stoloniferous herbs with oblong, hairy leaves; flowers borne on a small spadix surrounded by a tubular spathe (**Pistia*) **ARACEAE**
- 1b Plants rooted or freely suspended with leaves submerged or floating:
- 3a Gynoecium composed of 2 or more free carpels with separate styles and stigmas:
- 4a Perianth absent or cupular; stamens 1 or 2:
- 5a Flowers bisexual, in spikes above water at anthesis, spikes consisting of 2 naked flowers facing in opposite directions and borne at different heights; carpels 4–8, becoming stipitate in fruit and appearing umbellate; stamens 2, free **RUPPIACEAE**
- 5b Flowers unisexual, submerged, axillary, cymose or solitary; carpels 1–9, stipitate; stamens 1 or 2, united:
- 6a Marine plants, dioecious; pollen filamentose **CYMODACEAE**
- 6b Brackish or freshwater plants, monoecious; pollen globose **ZANNICHELLIACEAE**
- 4b Perianth present, composed of 1–4 free tepals; stamens 3–many:
- 7a Leaves borne on elongated stems; tepals usually 4; inflorescence a simple spike not enclosed in a spathe when young **POTAMOGETONACEAE**
- 7b Leaves all basal; tepals 1–3; inflorescence a 2-branched or simple spike at first enclosed in a spathe:
- 8a Flowers in a 2-branched or simple spike on an elongated axillary peduncle at first enclosed in a spathe; flowers without bracts **APONOGETONACEAE**
- 8b Flowers whorled or in simple or compound umbels; plants often with white sap:
- 9a Carpels each with 1 basal ovule; fruit of 3–many achenes **ALISMACEAE**
- 9b Carpels each with many ovules on a parietal placenta; fruit a head of follicles **LIMNOCHARITACEAE**
- 3b Gynoecium composed of 1 carpel or of 2 or more united carpels with free or united styles:
- 10a Perianth present; ovary inferior, 1-locular with many ovules on parietal placentas; flowers mostly unisexual, submerged in marine species, exerted during anthesis in others; male flowers sometimes becoming detached and free-floating **HYDROCHARITACEAE**
- 10b Perianth absent; ovary superior, with a solitary ovule:
- 11a Leaves opposite or verticillate, often toothed; flowers solitary or few together in leaf axils; freshwater plants **NAJADACEAE**
- 11b Leaves alternate; inflorescence a spike of alternating male and female flowers enclosed in a spathe; marine plants **ZOSTERACEAE**

GROUP 4 (*Flowers (florets) arranged in small spikes (spikelets) subtended or enclosed by bracts; grasses and grass-like plants*)

- 1a Leaves reduced to sheaths with free margins; plants dioecious; florets with a perianth of 6 tepals in 2 whorls **RESTIACEAE**
- 1b Leaves usually with a well-developed blade and a sheathing base; plants very rarely dioecious; florets mostly with 2–6 scale-like bracts or bristles:
- 2a Leaves 2-ranked; leaf sheaths usually with free, overlapping margins; stems terete or compressed, usually with hollow internodes; style branches and stigmas usually 2, feathery; anthers deeply sagittate and therefore appearing dorsifixed **POACEAE**
- 2b Leaves often 3-ranked, mostly crowded in a basal tuft; leaf sheaths usually closed; stems often 3-angled, with solid internodes; style branches and stigmas 2 or 3, not feathery; anthers basifixed **CYPERACEAE**

GROUP 5 (*Land plants, sometimes rooting in water; perianth glumaceous to hyaline, or sometimes herbaceous, or reduced to bristles or scales or absent*)

- 1a Leaves pinnately or palmately compound; palms **ARECACEAE**
- 1b Leaves simple:
- 2a Palm-like dioecious trees with coriaceous, linear-ensiform leaves, often longer than 1 m, arising from apex of stem in 3 spiralling ranks **PANDANACEAE**
- 2b Herbaceous plants:
- 3a Inflorescence a very dense cylindrical spike with female florets below and male ones above; perianth segments reduced to bristles .. **TYPHACEAE**
- 3b Inflorescence various, not as above:
- 4a Inflorescence a dense fleshy spike (spadix) subtended by a conspicuous, variously coloured spathe **ARACEAE**
- 4b Inflorescence various, not a spadix:
- 5a Perianth segments herbaceous; fruit separating into 3 cocci; leaves radical **JUNCAGINACEAE**
- 5b Perianth segments dry and glumaceous to hyaline; leaves basal, cauline or reduced to sheaths; plants often rush-like:
- 6a Tufted herbs with radical leaves and small to minute flowers crowded in terminal, compact, head-like inflorescences borne on naked peduncles:
- 7a Flowers unisexual; ovary 3- or 2-locular **ERIOCAULACEAE**
- 7b Flowers bisexual; ovary 1-locular **XYRIDACEAE**
- 6b Combination of characters not as above:
- 8a Leaves reduced to sheaths; flowers unisexual, sexes on separate plants; ovary 1- or 3-locular with 1 ovule per locule **RESTIACEAE**
- 8b Leaves with blades; flowers bisexual; ovary ± 3-locular with many ovules per locule **JUNCACEAE**

GYMNOSPERMS

Cupressaceae (Pinopsida) (Coniferales)

Glen, H.F. in Leistner: 29 (2000); Quinn *et al.* 513 (2002).

Sthn trop. Afr.: genera 3, species 4.

Coates Palgrave (2002) notes that **Callitris endlicheri* (Parl.) F.M.Bailey, the Black Cypress from SE Australia, has escaped from forest plantations in moister parts of Zimbabwe and has become established in woodland and eucalyptus plantations.

**Cupressus* L.

Coates Palgrave: 90 (2002).

**Cupressus lusitanica* Mill., originally introduced from central America for timber, has escaped in eastern Zimbabwe.

Juniperus L.

Lewis: 88 (1960); Farjon: 267 (1992); White *et al.*: 80 (2001); Coates Palgrave: 91 (2002); Mapaura & Timberlake: 164 (2002); Msekandiana & Mlangeni: 35 (2002).

Sthn trop. Afr. 1: *Juniperus procera* Hochst. ex Endl., Zimbabwe, Malawi.

Widdringtonia Endl.

Lewis: 86 (1960); Silva: 41 (1983); Page: 309 (1990); Pauw & Linder: 297 (1997); White *et al.*: 82 (2001); Coates Palgrave: 91 (2002); Msekandiana & Mlangeni: 35 (2002).

Sthn trop. Afr. 2, Zimbabwe, Malawi, Mozambique, and sthn Afr.

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WHITE, F., DOWSETT-LEMAIRE, F. & CHAPMAN, J.D. 2001. *Evergreen forest flora of Malawi*. Royal Botanic Gardens, Kew.

Cycadaceae (Cycadopsida) (Cycadales)

Palm-like, rarely branched trees, up to 9 m high; trunk bearing spirally arranged, woody leaf bases and scale leaves, and crowned by a tuft of leaves. **Leaves** arranged in close spirals, pinnately compound, long; leaflets falcate, very narrowly lanceolate, entire, with 1 thick midrib and no lateral veins. **Male scales** (sporophylls) leathery, up to 50 mm long, arranged in apical, very narrowly ovoid cones, each scale with many pollen sacs, in groups of 3–5, on abaxial surface. **Female sporophylls** frond-like, up to 0.3 m long, lanceolate or narrowly ovate, irregularly dentate, thickened fertile central axis bearing 4 or 5 pairs of sessile marginal ovules, not forming a definite cone but spirally arranged in a densely crowded apical whorl. **Seeds** ovoid, ± 40 mm in diameter at maturity.

Genus 1, species 17, E Africa to Japan and Australia; sthn trop. Afr. species 1.

Cycas L.

Prain: 344 (1917); Lewis: 79 (1960); Silva: 5 (1983); Goode: 20 (1989); Johnson & Wilson: 370 (1990); De Laubenfels & Adema: 351 (1998); Goode: 303 (2001); Coates Palgrave: 74 (2002); Grobbelaar: 113 (2002).

Description as for family.

Species 17, E Africa to Japan and Australia; sthn trop. Afr. 1: *Cycas thouarsii* Gaudich., Mozambique.

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Gnetaceae

(Gnetopsida)

(Gnetales)

Dioecious, large-leaved, evergreen, loosely twining, remotely branched lianes; branches opposite or sometimes in whorls of 3, spreading to pendulous, somewhat thickened at nodes, glabrous. **Leaves** decussate, petiolate, simple, ovate-oblong to elliptic-oblong, entire, pinnately nerved; stipules absent. **Inflorescences** simple or branched, axillary or cauline, unisexual spikes bearing \pm 8 whorls of small sessile flowers surrounded by moniliform hairs; each spike with 2 opposite basal scales. **Male flowers** with a “perianth” of 2 partly connate scales surrounding a central column bearing at the tip 1 or 2 yellow microsporangia which open by an apical median slit. **Female flowers** with 1 ovule enclosed in an outer fleshy envelope (“perianth”) and 2 thinner inner envelopes (“integuments”), the innermost produced into a straight micropylar tube; imperfect flowers usually sterile and lacking outer “integument”. **Seed** at maturity enclosed in outer fleshy, coloured “perianth”, and an outer “integument” which forms a hard, ridged testa and an inner one which is thin and silky; embryo small, embedded in copious endosperm.

Genus 1; species \pm 30, tropical America, western trop. Africa and tropical Asia; sthn trop. Afr. 1.

Gnetum L.

Linnaeus: 637 (1767); Pearson: 330 (1917); Robyns: 11 (1948); Keay: 33 (1954); Kubitzki: 386 (1990); Carlquist & Robinson: 123 (1995); Rydin *et al.*: 197 (2002).

Description as for family.

Species \pm 30: \pm 7 in tropical America, 2 in western tropical Africa, the rest in tropical Asia; sthn trop. Afr. 1: *Gnetum africanum* Welw., Angola.

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*Pinaceae

(Pinopsida)

(Coniferales)

Glen, H.F. in Leistner: 30 (2000).

Sthn trop. Afr.: genus 1, species 3.

*Pinus L.

Page: 319 (1990); Mullin: 199 (2000); White *et al.*: 84 (2001); Coates Palgrave: 89 (2002); Quinn *et al.*: 513 (2002).

Various species are cultivated in sthn trop. Africa. Coates Palgrave (2002) lists 3 species as invaders of natural vegetation in eastern Zimbabwe; one of them, **Pinus patula* Schiede ex Schltdl. & Cham., is also recorded for the adjacent Mozambique.

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Podocarpaceae

(Pinopsida)

(Coniferales)

Glen, H.F. in Leistner: 30 (2000).

Podocarpus L'Hér. ex Pers.

Lewis: 85 (1960); White: 44 (1970); Silva: 35 (1983); De Laubenfels: 251 (1985); Dowsett-Lemaire & White: 86 (1990); Leistner *et al.*: 233 (1995); Stockey *et al.*: 923 (1998); Mullin: 199 (2000); White *et al.*: 85 (2001); Coates Palgrave: 87 (2002).

Afrocarpus (Buchholz & N.E.Gray) C.N. Page: 339 (1990); Goldblatt & Manning: 50 (2000); Quinn *et al.*: 513 (2002).

Species 95, southern temperate regions and tropical highlands from West Indies to Japan; sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi,

Mozambique, and sthn Afr.

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Stangeriaceae

(Cycadopsida)
(Cycadales)

Glen, H.F. in Leistner: 31 (2000).

Genera 2, species 3, Queensland, Australia and Africa; sthn trop. Afr.: genus 1, species 1.

Stangeria T.Moore

Vorster & Vorster: 79/8 (1974/1985); Steyn & Smith: 2 (1999); Goode: 299 (2001); Kokubugata *et al.*: 475 (2001); Grobbelaar: 308 (2002); Izidine & Bandeira: 53 (2002).

Monotypic genus: *Stangeria eriopus* (Kunze) Baill., southern border of Mozambique, and sthn Afr.

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Welwitschiaceae

(Gnetopsida)
(Gnetales)

Glen, H.F. in Leistner: 32 (2000).

Sthn trop. Afr.: genus 1, species 1.

Welwitschia Hook.f.

Bornman: 1 (1978); Bustard: 85 (1990); Kubitzki: 390 (1990); Von Willert: 639 (1993); Carlquist & Gowans: 107 (1995); Steyn & Smith: 1 (1999); Leuenberger: 357 (2001); Van Jaarsveld & Linder Smith: 2 (2001); Coates Palgrave: 93 (2002); Rydin *et al.*: 513 (2002).

Monotypic genus: *Welwitschia mirabilis* Hook.f., confined to the Namib Desert in Angola, and in sthn Afr. (Namibia).

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Zamiaceae

(Cycadopsida)
(Cycadales)

Glen, H.F. in Leistner: 32 (2000).

Sthn trop. Afr.: genus 1, species 14.

Encephalartos Lehm.

Lewis: 79 (1960) under Cycadaceae; Dyer & Verdoorn: 147 (1969); Silva: 8 (1983) under Cycadaceae; Lavranos & Goode: 11 (1985); Johnson & Wilson: 371 (1990); Norstog & Nicholls: 1 (1997); Goode: 1 (2001); White *et al.*: 89 (2001); Coates Palgrave: 74 (2002); Dombo *et al.*: 12 (2002); Grobbelaar: 1 (2002); Izidine & Bandeira: 52 (2002); Mapaura & Timberlake: 170 (2002); Msekandiana & Mlangeni: 38 (2002).

Species ± 65, tropical and sthn Afr.; sthn trop. Afr. 14, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

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DICOTYLEDONS

Acanthaceae (Asteridae—Scrophulariales) (Asterids—Lamiales)

Balkwill, K. & Welman, W.G. in Leistner: 34 (2000). General family reference: Balkwill & McCallum: 11(1999).

Sthn trop. Afr.: genera 49, species ± 385.

Classification of Acanthaceae of sthn trop. Afr.

[after Scotland & Vollesen (2000)]

- I. Subfamily NELSONIOIDEAE (retinacula 0; cystoliths 0; descending cochlear aestivation): *Anisosepalum*, *Elytraria*, *Nelsonia*, *Staurogyne*
- II. Subfamily THUNBERGIOIDEAE (retinacula 0; primarily lianes; bristled anthers; capsules or drupes): *Anomacanthus*, *Pseudocalyx*, *Thunbergia*
- III. Subfamily ACANTHOIDEAE (retinacula present; capsules explosive):
 - 1. Tribe **Acantheae** (cystoliths absent; pollen colpate; anthers 4, 1-thecate): *Acanthus*, *Blepharis*, *Crossandra*, *Sclerochiton*, *Stenandrium*
 - 2. Tribe **Ruelliae** (cystoliths present):
 - a. Subtribe Ruelliinae (left-contort aestivation; filament curtains: filaments united 2 x 2 to the corolla tube thus forming 2 folds which extend to corolla base): *Acanthopale*, *Brillantaisia*, *Dischistocalyx*, *Duosperma*, *Dyschoriste*, *Hygrophila*, *Mellera*, *Mimulopsis*, *Petalidium*, *Phaulopsis*, *Ruellia*, *Strobilanthopsis*
 - b. Subtribe Justiciinae (ascending cochlear aestivation; ovules 2 or 4): *Anisotes*, *Asystasia*, *Brachystephanus*, *Dicliptera*, *Ecbolium*, *Hypoestes*, *Isoglossa*, *Justicia*, *Megalochlamys*, *Metarungia*, *Monechma*, *Monotheceum*, *Oreacanthus*, *Peristrophe*, *Pseuderanthemum*, *Rhinacanthus*, *Rungia*, *Ruspolia*, *Ruttya*
 - c. Subtribe Barleriinae (quincuncial aestivation): *Barleria*, *Crabbea*, *Lepidagathis*

Unplaced within Acanthoideae: *Neuracanthus*, *Whitfieldia*

Genus to be excluded from Acanthaceae: *Thomandersia*

Key to genera

- 1a Seeds not borne on retinacula:
 - 2a Fertile stamens 2:
 - 3a Plants with rosulate leaves and scapose inflorescences; scape covered with alternate bracts from base to tip **Elytraria**
 - 3b Plants prostrate, with internodes visible between leaves, rooting at the nodes **Nelsonia**
 - 2b Fertile stamens 4:
 - 4a Ovary with 1 or 2 collateral ovules in each locule:
 - 5a Shrubs; calyx with 5 lobes; ovary with 1 large ovule per locule; fruit a large drupe with 2 subglobose pyrenes flattened on one side **Anomacanthus**
 - 5b Herbs of various habit or subshrubs; calyx mostly with 10–18 linear lobes or cupular; ovary with 2 collateral ovules per locule; fruit a globose, abruptly rostrate capsule:
 - 6a Anthers opening by apical pores **Pseudocalyx**
 - 6b Anthers mostly opening by ± distinct longitudinal slits: **Thunbergia**
 - 4b Ovary with 4–14 ovules in 2 rows in each locule:
 - 7a Bracteoles fused to base of calyx, resembling anterior calyx lobes and covering the rudimentary lateral lobes **Anisosepalum**
 - 7b Bracteoles not fused to base of calyx; lateral calyx lobes slightly shorter than anterior ones but neither much reduced nor covered by the bracteoles **Staurogyne**
- 1b Seeds borne on retinacula:
 - 8a Corolla 1-lipped, with the adaxial suture slit; stamens 4, all 1-thecous:
 - 9a Stamens included in corolla tube, filaments epipetalous for most of their length, slender; corolla yellow, orange or red **Crossandra**
 - 9b Stamens exerted beyond corolla throat; filaments epipetalous for up to half their length, stout; corolla white, blue or purple or various combinations of these:
 - 10a Calyx with 5 lobes **Sclerochiton**
 - 10b Calyx with 4 lobes:
 - 11a Seed surface with feathery hygroscopic structures; anticous filaments produced into a protuberance **Blepharis**
 - 11b Seed surface glabrous; filaments not forming a protuberance **Acanthus**
 - 8b Corolla 2-lipped, subregular or regular, adaxial suture not slit; stamens 2 or 4, 1- or 2-thecous:
 - 12a Seeds with hygroscopic uniseriate hairs; corolla aestivation contorted or occasionally imbricate (*Ruellia*) or induplicate (*Neuracanthus*), but then not ascending; fertile stamens mostly 4, sometimes 2:
 - 13a Calyx lobes 4, abaxial and adaxial lobes larger than lateral lobes; stamens not didynamous **Barleria**
 - 13b Calyx lobes 5, rarely 4 (*Hygrophila*), but then these are ± equal in size; stamens didynamous:

- 14a Corolla regular or subregular:
- 15a Calyx \pm 2-lipped:
- 16a Calyx with upper lip 3-fid, lower lip 2-fid; corolla with induplicate aestivation in bud **Neuracanthus**
- 16b Calyx with 2 segments free nearly to base and 3 segments fused nearly to middle; corolla with quincuncial (imbricate) aestivation in bud **Ruellia**
- 15b Calyx regular to subregular; corolla with contorted aestivation in bud:
- 17a Inflorescences highly congested dichasial cymes surrounded by bracts **Crabbea**
- 17b Inflorescences paniculate, spike-like, \pm capitate, thyrses, cymes, or flowers solitary:
- 18a Ovary with 3 or more ovules per locule:
- 19a Anthers blunt at base; ovules many per locule **Dischistocalyx**
- 19b Anthers with 1 theca long-spurred; ovules 3 or 4 per locule **Mimulopsis**
- 18b Ovary with 2 ovules per locule:
- 20a Densely branched glandular undershrubs with unpleasant smell **Strobilanthopsis**
- 20b Erect or scrambling shrubs or undershrubs, not glandular, without unpleasant smell **Acanthopale**
- 14b Corolla distinctly 2-lipped:
- 21a Calyx lobes 4 **Hygrophila**
- 21b Calyx lobes 5:
- 22a Fertile stamens 2:
- 23a Flowers in a terminal or lateral thyrses; ovary with many ovules per locule **Brillantaisia**
- 23b Flowers in axillary dichasial cymes; ovary with 2 ovules per locule **Chaetacanthus**
- 22b Fertile stamens 4:
- 24a Capsule with 1 seed per locule **Duosperma**
- 24b Capsule with 2 or more seeds per locule:
- 25a Capsule with 2 seeds per locule:
- 26a Calyx 2-lipped: upper lip 4-lobed, lower lip of 1 much enlarged lobe **Phaulopsis**
- 26b Calyx regular or subregular with 5 similar to unequal lobes:
- 27a Ultimate 2 bracts large, enclosing calyx; calyx regular, glandular, lobes 4 or 5 **Petalidium**
- 27b Ultimate bracts/bracteoles shorter than calyx; calyx regular or subregular, not glandular, lobes 5:
- 28a Calyx regular, tube longer than lobes, cylindrical or narrowly campanulate, 5-ribbed **Dyschoriste**
- 28b Calyx subregular, tube shorter than lobes, lobes unequal: posterior one usually longer and broader than the others, and lateral lobes often pointed or spinescent **Lepidagathis**
- 25b Capsule with 3 or more seeds per locule:
- 29a Calyx \pm 2-lipped with 3 teeth connate almost to the middle **Ruellia**
- 29b Calyx divided almost to base into 5 linear lobes **Mellera**
- 12b Seeds without hygroscopic uniseriate hairs (although they may have tubercles or hygroscopic glochidiate hairs); corolla aestivation ascending (imbricate); fertile stamens 4 or 2:
- 30a Fertile stamens 4:
- 31a Anthers 1-theous **Stenandrium**
- 31b Anthers 2-theous:
- 32a Ovary with 8 or more ovules in 2 rows **Staurogyne**
- 32b Ovary with 2 ovules per locule:
- 33a Bracteoles large, membranous, often coloured **Whitfieldia**
- 33b Bracteoles small to absent:
- 34a Bracteoles filiform-subulate; anther thecae superposed; capsule stipitate **Asystasia**
- 34b Bracteoles scale-like at base of calyx; anther thecae at same level; capsule sessile **Thomandersia** [to be excluded from Acanthaceae fide Scotland & Vollesen (2000)]
- 30b Fertile stamens 2:
- 35a Anthers 1-theous:
- 36a Flowers resupinate (3-lobed lip of corolla above 2-lobed lip); flowers appearing as though enclosed by 2 opposite bracts which may be connate into a tube **Hypoestes**
- 36b Flowers not resupinate (2-lobed lip of corolla above 3-lobed lip); bracts small:
- 37a Ovary and style base hairy **Monothecium**
- 37b Ovary and style base glabrous:
- 38a Flowers small, corolla tube shorter than 10 mm; inflorescence a many-flowered, terminal, viscid panicle **Oreacanthus**
- 38b Flowers larger, corolla tube longer than 10 mm:
- 39a Staminodes 0; style \pm capitate **Brachystephanus**
- 39b Staminodes 2; style 2-branched:
- 40a Corolla tube considerably longer than upper lip **Ruspolia**
- 40b Corolla tube shorter than or \pm as long as upper lip **Ruttya**
- 35b Anthers 2-theous:
- 41a Flowers resupinate (3-lobed lip of corolla above 2-lobed lip):
- 42a Capsules with inelastic placental bases **Peristrophe**

- 42b Capsules with elastic placental bases **Dicliptera**
- 41b Flowers not resupinate (2-lobed lip of corolla above 3-lobed lip):
- 43a Corolla with a distinct rugula in upper lip:
- 44a Pollen sphaeroidal, with a pustulate ring of exine around the equator; anthers in species with cream flowers attached at right angles to filaments **Isoglossa**
- 44b Pollen prolate; anthers attached parallel to filaments:
- 45a Corolla orange, red or yellowish brown, lower lip longer than 25 mm and narrower than 10 mm:
- 46a Capsules with inelastic placental bases **Anisotes**
- 46b Capsules with elastic placental bases:
- 47a Anther thecae blunt at the base **Metarungia**
- 47b Anther thecae spurred at the base, at least lower one **Rungia**
- 45b Corolla white, cream, lilac, pink, purple or blue, lower lip shorter than 25 mm or if longer, than broader than 10 mm:
- 48a Corolla tube longer than lips **Rhinacanthus**
- 48b Corolla tube shorter than lips:
- 49a Seeds single in each locule, smooth and shiny **Monechma**
- 49b Seeds paired in each locule, rough and often tuberculate (sometimes a single smooth, shiny seed is borne in an indehiscent capsule) **Justicia**
- 43b Corolla without or with an indistinct rugula in the upper lip:
- 50a Inflorescence with small bracts; calyx easily visible **Pseuderanthemum**
- 50b Inflorescence with large bracts obscuring the calyx:
- 51a Corolla thin-textured, lobes ± as long as or longer than the tube, bright or pale blue; staminodes 0; pollen prolate, without pseudocolpi, yellow when fresh **Megalochlamys**
- 51b Corolla thick-textured, the lobes much shorter than the tube, green, lilac or white; staminodes 2; pollen almost sphaeroidal, with pseudocolpi, white or pink when fresh **Ecbolium**

Acanthopale C.B. Clarke

(Acanthoideae—Ruelliaceae—Ruelliaceae)

Clarke: 62 (1899); Bremekamp: 142 (1943); Heine: 15 (1966a); Binns: 12 (1968); White *et al.*: 112 (2001).

Shrubs or subshrubs, branched, pubescent or glabrescent; branches often obtusely quadrangular. **Leaves** ± cuneate at base, narrowing gradually into petiole; apex caudate-acuminate; margin ± entire; cystoliths often conspicuous, at least when plant dry. **Inflorescence** spike-like, terminal or axillary; bracts obovate, longer than calyx; bracteoles linear to linear-spathulate. **Calyx** equally to subequally divided almost to base into 5 linear to linear-oblong sepals. **Corolla** ± regular, trumpet-shaped with a very short tube, mostly white with pink to purple markings within. **Androecium**: stamens 4, subequal; filaments glabrous to hairy towards base; anthers 2-theous, parallel, linear-oblong, at equal height, blunt at base. **Gynoecium**: ovary glabrous, 2-locular, with 2 ovules per locule; style hairy, one branch linear-oblong, the other very small and tooth-like or absent. **Capsule** glabrous, elliptic-oblong, bearing 2–4 seeds on retinacula in basal part. **Seeds** lens-shaped, with many hygroscopic hairs.

Species 15, palaeotropics; sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi, Mozambique.

Acanthus L.

(Acanthoideae—Acantheae)

Clarke: 105 (1899); Benoist: 24 (1950); Heine: 410 (1963); Heine: 111 (1966a); Napper: 332 (1970); White *et al.*: 112 (2001).

Subshrubs, shrubs or small trees. **Leaves** pinnatifid or lobate to rarely entire, margin often spiny. **Inflorescences** ± dense, short to long terminal spikes; bracts and bracteoles present. **Calyx** divided to base into 4 sepals; anterior and posterior sepal much larger than lateral ones. **Corolla** 1-lipped; tube very short; anterior lip 3–5-lobed with middle lobe outside in

bud; posterior lip represented by a thickened sinus at level of insertion of stamens. **Androecium**: stamens 4, ± equal; filaments glabrous; anthers 1-theous, oblong, mucicous, fringed with white hairs. **Gynoecium**: ovary 2-locular, with 2 ascending ovules per locule; style mostly glabrous, bifid at apex. **Capsule** ellipsoid, woody, shiny brown, 2–4-seeded. **Seeds** discoid, glabrous.

Species 30, tropical and warm Old World; sthn trop. Afr. 2, Angola, Zambia, Malawi.

Anisosepalum E. Hossain

(Nelsonioideae)

Hossain: 377 (1972); Champluvier: 127 (1991); Champluvier: 1313 (1994).

Staurogynne Wall., in part; Hossain: 377 (1972).

Herbaceous to suffrutescent, erect to procumbent. **Leaves** opposite, sometimes ternate, entire to crenate-serrate, variably pilose, lower surface often paler than upper. **Inflorescences**: flowers usually many, in spike-like racemes or spikes, terminal or on very short lateral branches, sometimes only 2 or 3; bracts and bracteoles present. **Calyx** of 5 very dissimilar sepals shortly fused at base; posterior ones much shorter than anterior ones; lateral ones much reduced, ± hyaline. **Corolla** 2-lipped, funnel-shaped; upper lip ± cucullate and entire to faintly bilobed. **Androecium**: stamens 4, didynamous, included; anther thecae ellipsoid, diverging, often slightly mucronate at base; staminode 1 or absent. **Disc** usually distinct. **Gynoecium**: ovary glabrous; ovules 4–8(9) per locule, in two rows; style sparsely papillate; stigma bilobed, anterior lobe shorter than bilobed posterior lobe. **Capsule** woody, ovate-triangular in outline, ± compressed. **Seeds** subglobose, with rugose testa.

Species 3, central Africa; sthn trop. Afr. 2, ?Angola, Zambia.

Anisotes Nees

(Acanthoideae—Ruelliaceae—Justiciaceae)

White: 381 (1962); Baden: 623 (1981b); Coates Palgrave: 1020 (2002).

Species 19, tropical and sthn Africa, Madagascar and tropical Arabian Peninsula; sthn trop. Afr. 5, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Anomacanthus R.D.Good

(Thunbergioideae/Mendoncioideae)

Good: 161 (1923); Good: 312 (1925); Brummitt: 710 (1990).

Gilletiella De Wild. & T.Durand; Moore: 129 (1930); Benoist: 5 (1950).

Scandent shrubs. **Leaves** shortly petiolate, ovate, entire; without cystoliths. **Flowers** single or few, axillary; bracteoles large, fused, keeled, acuminate, with conspicuous veins, enclosing corolla. **Calyx** annular, very short, truncate. **Corolla** ± 2-lobed, lower lip with anterior lobe smaller than others, lobes of upper lip ± fused. **Stamens** 4, of equal length, arising in corolla throat, included; filaments curved, thick, shorter than anthers; posterior anthers 2-locular; anterior ones 1-locular. **Disc** annular, very prominent. **Ovary** subglobose, almost embedded in disc; ovules large, 1 per locule; style elongate, included; stigma funnel-shaped, slightly bifid. **Fruit** drupaceous, large, with 2 large subglobose woody pyrenes flattened on one side; retinacula absent. **Seeds** large, with soft testa.

Monotypic: *Anomacanthus congolanus* (De Wild. & T.Durand) Brummitt (= *A. drupaceus* R.D.Good), Western Zaire and Angola (Cabinda).

Asystasia Blume

(Acanthoideae—Ruellieae—Justiciinae)

Eyles: 485 (1916); Benoist: 25, 36 (1950); White: 381 (1962); Heine: 126 (1966a); Karlström: 235 (1975); Brummitt & Chisumpa: 703 (1978); Edwards: 231 (1987); Edwards: 305 (1991); Kelbessa: 929 (1998); Bingham (Unpublished); Phiri (Unpublished).

Sthn trop. Afr. 9, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Barleria L.

(Acanthoideae—Ruellieae—Barleriinae)

Eyles: 483 (1916); Obermeyer: 123 (1933); Benoist: 15, 34 (1950); Heine: 419 (1963); Heine: 161 (1966a); Balkwill & Balkwill: 393 (1996).

Sthn trop. Afr. ± 50, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Blepharis Juss.

(Acanthoideae—Acantheae)

Benoist: 21, 35 (1950); Napper: 323 (1970); Vollesen: 1 (2000); Izidine & Bandeira: 49 (2002).

Sthn trop. Afr. 42, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Brachystephanus Nees

(Acanthoideae—Ruellieae—Justiciinae)

Clarke: 177 (1899); Heine: 237 (1966a); Heine: 649 (1971); Champluvier & Figueiredo: 413 (1996); Figueiredo & Jury: 753 (1996); Mapaura & Timberlake: 161 (2002).

Herbs, subshrubs or shrubs, with adventitious roots, with

multicellular, sometimes glandular hairs; stem angular, tomentose to glabrescent. **Leaves** attenuate, caudate, subentire to crenate, petiolate but those subtending inflorescence often almost sessile. **Inflorescences** spicate or paniculate, terminal and axillary; bract and bracteoles present. **Calyx**: sepals 5, separate nearly to base, subequal or unequal, linear. **Corolla** 2-lipped; tube very long and slender; lobes subequal, subentire. **Androecium**: stamens 2, far exserted, arising in mouth of tube; anthers 1-theous, dorsifixed, obtuse; staminodes absent. **Gynoecium**: ovary fusiform, glabrous; ovules 2 per locule; style glabrous; stigma ± capitate. **Capsule** small, oblong, usually 4-seeded. **Seeds** obovoid, compressed, muricate, without hairs.

Species 10, trop. Africa; sthn trop. Afr. 3, Angola, Zimbabwe, Malawi.

Brillantaisia P.Beauv.

(Acanthoideae—Ruellieae—Ruellinae)

Burkill: 37 (1899); Benoist: 7 (1950); Heine: 83 (1966a); Binns: 12 (1968); Sidwell: 67 (1998).

Erect to prostrate herbs to erect, sturdy shrubs; stems square, glabrous to densely pubescent; cystoliths longitudinal, narrowing towards one end. **Leaves** broadly ovate to ovate, occasionally elliptic or linear-lanceolate; base cordate to cuneate; margin entire to regularly toothed; glabrous to pubescent; petiolate, lamina decurrent in top half of usually winged petiole. **Inflorescence** a terminal or lateral thyrses; bracts foliaceous; bracteoles linear to obovate. **Calyx** with 5 equal or unequal, linear to spatulate sepals. **Corolla** 2-lipped, purple to blue, occasionally white; tube cylindrical with 2 brown-yellow markings in throat; upper lip hooded, 2-lobed; lower lip broad, reflexed at edges, 3-lobed, 2 lateral membranous pouches at base of lower lip forming a hinge with apex of tube. **Androecium** with 2 posterior stamens fertile; filaments white, flattened; anthers sagittate, dorsifixed; 2 anterior ones reduced to slender staminodes, often with vestigial anther, occasionally minute or absent. **Gynoecium**: style slender, not exserted; stigma a single flattened lobe; second lower lobe reduced to a minute tooth; ovules many. **Capsule** linear, pointed, with deep longitudinal grooves down centre of the 2 valves. **Seeds** rounded to slightly kidney-shaped, flattened, borne on retinacula, covered with adpressed hygroscopic hairs.

Species 12, trop. Africa, Madagascar; sthn trop. Afr. 6, Angola, Zambia, Zimbabwe, Malawi, Mozambique.

Crabbea Harv.

(Acanthoideae—Ruellieae—Barleriinae)

Ficalho & Hiern: 24 (1881); Clarke: 118 (1899); Eyles: 483 (1916); Binns: 13 (1968); Phiri (Unpublished).

Sthn trop. Afr. 3, Angola, Zambia, Malawi, Zimbabwe, Mozambique, and sthn Afr.

Crossandra Salisb.

(Acanthoideae—Acantheae)

Clarke: 112 (1899); Benoist: 25 (1950); Napper: 334 (1970); Vollesen: 503 (1990); Vos & Edwards: (1992).

Sthn trop. Afr. 11, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Dicliptera Juss.

(Acanthoideae—Ruellieae—Justiciinae)

Benoist: 38 (1950); Binns: 13 (1968); Balkwill *et al.*: 1 (1996).

Species ± 150, pantropical; sthn trop. Afr. 22, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Dischistocalyx T.Anderson ex Benth. & Hook.f.

(Acanthoideae—Ruellieae—Ruellinae)

Bentham & Hooker: 1080 (1876) as *Distichocalyx*; Clarke: 60 (1899) as *Distichocalyx*; Moore: 130 (1930); Heine: 397 (1963); Heine: 15 (1966a).

Subshrubs, geniculate and ± ascending, with multicellular hairs, especially on young parts and inflorescence. **Leaves** petiolate, ovate-elliptic or lanceolate, acutely cuneate at base, acuminate, entire or faintly crenulate; with many short, rod-like cystoliths on both surfaces. **Inflorescences** terminal, dense, few-flowered spikes to ± capitate; bracts early deciduous. **Flowers** sessile with minute subulate bracteoles at base of calyx. **Calyx**: lobes unequal: anterior 2 free to base, linear-narrowly elliptic, posterior 3 fused half-way or further. **Corolla** large to medium-sized; lower ± 1/4 of tube narrowly cylindrical, upper portion campanulate-funnelshaped; lobes 5, rounded, spreading. **Stamens** 4, arising in narrow, cylindrical portion of corolla tube, didynamous; filaments and connectives of anthers finely pubescent; shorter stamens arising above longer ones; anthers all similar, not spurred. **Ovary** glabrous; ovules many; style ± glabrous; stigma with 1 branch well-developed, recurved, other branch rudimentary. **Capsule** linear to narrowly obovate, glabrous, containing ± 10 seeds in each locule. **Seeds** with a ring of hygroscopic hairs.

Species 6, trop. Africa; sthn trop. Afr. 1: *Dischistocalyx hirsutus* C.B.Clarke, Angola (Cabinda).**Duosperma** Dayton

(Acanthoideae—Ruellieae—Ruellinae)

Brummitt: 411 (1974).

Duosperma C.B.Clarke in part; Binns: 13 (1968); Mapaura (Unpublished).

Sthn trop. Afr. 7, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Dyschoriste Nees

(Acanthoideae—Ruellieae—Ruellinae)

Clarke: 71 (1899); Eyles: 481 (1916); Benoist: 8, 34 (1950); White: 382 (1962); Binns: 13 (1968); Brummitt: 134 (1983).

Dyschoriste C.B.Clarke in part; Martins: 57 (1994); Bingham (Unpublished); Phiri (Unpublished).

Sthn trop. Afr. ± 10, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Ecbolium Kurz

(Acanthoideae—Ruellieae—Justiciinae)

Benoist: 26, 36 (1950); Vollesen: 638 (1989); Bingham (Unpublished); Mapaura (Unpublished).

Species 22, eastern and southern Africa, Madagascar, Comoro Islands, Arabian Peninsula, India and Malaysia; sthn trop. Afr. 4, Angola, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Elytraria Michx.

(Nelsonioideae)

Morton: 49 (1956); Dokosi: 256 (1971); Mapaura (Unpublished).

Tubiflora J.F.Gmel.; Moore: 129 (1930); Benoist: 7 (1950).

Sthn trop. Afr. 2, Angola, Zambia, Zimbabwe, Malawi, and sthn Afr.

Hygrophila R.Br. emend. Heine

(Acanthoideae—Ruellieae—Ruellinae)

Burkill: 30 (1899); Eyles: 481 (1916); Benoist: 7, 34 (1950); Heine: 394 (1963); Heine: 656 (1971).

Hemigraphis in the sense of Benoist: 34 (1950). *Synnema* Benth.; Moore: 129 (1930); Martins: 57 (1994).

Sthn trop. Afr. ± 16, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Hypoestes Sol. ex R.Br.

(Acanthoideae—Ruellieae—Justiciinae)

Clarke: 244 (1900); Eyles: 485 (1916); Benoist: 32, 38 (1950); Binns: 14 (1968); Balkwill & Getliffe Norris: 133 (1985); Mapaura (Unpublished).

Sthn trop. Afr. ± 5, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Isoglossa Oerst.

(Acanthoideae—Ruellieae—Justiciinae)

Clarke: 227 (1900); Eyles: 486 (1916); Brummitt: 785 (1985); Hansen: 1 (1985); Msekandiana & Mlangeni: 34 (2002).

Sthn trop. Afr. ± 10, ?Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Justicia L.

(Acanthoideae—Ruellieae—Justiciinae)

Benoist: 26, 37 (1950); Heine: 213 (1966a); Morton: 433 (1978); Hedren: 129 (1988); Graham: 551 (1989); Hedren: 1 (1989); Kelbessa: 1 (1990); Champluvier: 231 (2002b).

Adhatoda Mill.; Balkwill & Welman: 36 (2000). *Duvernoia* E.Mey. ex Nees; Manning & Getliffe Norris: 15 (1995); Izidine & Bandeira: 43 (2002).

Sthn trop. Afr. ± 40, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Lepidagathis Willd.

(Acanthoideae—Ruellieae—Barleriinae)

Clarke: 120 (1900); Eyles: 483 (1916); Benoist: 20, 35 (1950); Morton: 333 (1988).

Sthn trop. Afr. ± 15, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Megalochlamys Lindau

(Acanthoideae—Ruellieae—Justiciinae)

Vollesen: 605 (1989).

Species 10, eastern and southern Africa, and extending to the Arabian Peninsula; sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Melleria S.Moore

(Acanthoideae—Ruellieae—Ruelliiinae)

Moore: 225 (1879); Lindau: 297 (1896); Clarke: 50 (1899); Eyles: 481 (1916); Binns: 15 (1968); White *et al.*: 116 (2001).*Onus* Gilli; Phiri (Unpublished).

Small shrubs. **Leaves** large, petiolate, dentate. **Inflorescences** axillary to terminal spike-like cymes; bracteoles 2, linear-oblong, as long as calyx. **Calyx** divided nearly to base into 5 subequal, linear-oblong sepals. **Corolla** 2-lipped; tube gradually widening, \pm as long as lobes; middle lobe of lower lip much larger than lateral ones, hairy within. **Androecium**: stamens 4, subsimilar, exerted; anthers 2-theous, spurred at base to almost muticous. **Gynoecium**: ovary with 4–6 ovules in each locule; style filiform, with 1 oblong-linear stigmatic arm, posterior arm suppressed. **Capsule** seed-bearing almost from base. **Seeds** compressed, glabrous on faces but with long white hygroscopic hairs on margin, borne on retinacula.

Species 4 or 5, trop. Africa; sthn trop. Afr. 3 or 4, Zambia, Zimbabwe, Malawi, Mozambique.

Metarungia C.Baden

(Acanthoideae—Ruellieae—Justiciinae)

Baden: 638 (1984); Edwards *et al.*: 200 (2001); Phiri (Unpublished).*Macrorungia* of various authors, not of C.B. Clarke; Binns: 15 (1968); Baden: 143 (1981a); Coates Palgrave: 1018 (2002).

Species 3, tropical and sthn Afr.; sthn trop. Afr. 2, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Mimulopsis Schweinf.

(Acanthoideae—Ruellieae—Ruelliiinae)

Schweinfurth: 677 (1868); Lindau: 301 (1896); Clarke: 54 (1899); Binns: 15 (1968); White *et al.*: 116 (2001); Bingham (Unpublished).

Perennial herbs to shrubs. **Leaves** long-petioled, \pm ovate, irregularly dentate. **Inflorescence** paniculate, usually composed of dichasia, lax or dense; bract usually remote from calyx; bracteoles 2, linear or ligulate, persistent, shorter than calyx. **Calyx** divided nearly to base into 5 subequal, linear or narrowly ligulate sepals. **Corolla** almost regular; tube widely campanulate; petals 5, subequal, ovate, contorted in bud. **Androecium**: stamens 4, subsimilar; filaments nearly glabrous; anthers of 2 anterior stamens with 1 theca long-spurred. **Disc** low, thick. **Gynoecium**: ovary with 3 or 4 ovules per locule. **Capsule** lanceolate, seed-bearing from base, usually with 6 or 8 seeds. **Seeds** compressed, nearly glabrous on faces but with many hygroscopic hairs on margin, borne on long retinacula.

Species 30, trop. Africa, Madagascar; sthn trop. Afr. ?2, Zambia, Zimbabwe, Malawi.

Monechma Hochst.

(Acanthoideae—Ruellieae—Justiciinae)

Clarke: 212 (1900); Eyles: 486 (1916); Benoist: 29, 37 (1950); Munday: 47 (1995).

Sthn trop. Afr. \pm 10, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.**Monothecium Hochst.**

(Acanthoideae—Ruellieae—Justiciinae)

Hochstetter: 74 (1842); Lindau: 340 (1896); Clarke: 175 (1899).

Subshrubs or small shrubs. **Leaves** large, entire. **Inflorescences** dense, many-flowered terminal spikes; bracts and bracteoles linear or bristle-like. **Calyx** 5-fid to base; segments equal, linear. **Corolla** 2-lipped; tube straight; anterior lip 3-lobed; posterior lip notched at tip. **Androecium**: stamens 2, arising in throat, slightly exerted; anthers 1-theous, muticous. **Disc** annular. **Gynoecium**: ovary and style base hairy; style branches 2, equal, very short, oblong; ovules 2 per locule. **Capsule** oblong, 4(2)-seeded, lower part contracted. **Seeds** discoid, wrinkled, without hairs, borne on very long retinacula.

Species 3, trop. Africa to S India; sthn trop. Afr. 1: *Monothecium aristatum* (Nees) T. Anderson, Angola.**Nelsonia R.Br.**

(Nelsonioideae)

Bremekamp: 246 (1955); Heine: 158 (1966a); Binns: 15 (1968); Vollesen: 315 (1994).

Sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Neuracanthus Nees

(Unplaced within Acanthoideae)

Bidgood & Brummitt: 1 (1998); Furness: 77 (1998).

Species 30, trop. Africa, Madagascar, Arabian Peninsula and tropical Asia; sthn trop. Afr. 4, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Oreacanthus Benth.

(Acanthoideae—Ruellieae—Justiciinae)

Bentham: 1104 (1876); Friis & Vollesen: 465 (1982); Champluvier & Figueiredo: 413 (1996).

Subshrubs or shrubs. **Leaves** large, entire. **Inflorescence** many-flowered, terminal, viscid-hairy panicle composed of dichasia; bracts and bracteoles small, linear. **Calyx** small, divided to base into 5 equal, linear segments. **Corolla** 2-lipped, small; tube campanulate, short; anterior lip 3-lobed; posterior lip subentire. **Androecium**: stamens 2, exerted beyond lips; anthers 1-theous, muticous. **Gynoecium**: ovary and style base glabrous; stigma entire or 2-lobed; ovules 2 per cell. **Capsule** oblong, 4-seeded, lower part contracted. **Seeds** discoid, wrinkled, without hairs, borne on long retinacula.

Species 4, central Africa; sthn trop. Afr. 2(3), Angola, Zambia.

Peristrophe Nees

(Acanthoideae—Ruellieae—Justiciinae)

Benoist: 31 (1950); Binns: 15 (1968); Brummitt: 290 (1991); Balkwill: 83 (1996); Balkwill & Campbell-Young: 551 (2001); Mapaura & Timberlake: 161 (2002).

Sthn trop. Afr. 5, Angola, Zambia, Zimbabwe, Malawi, ?Mozambique, and sthn Afr.

Petalidium Nees

(Acanthoideae—Ruellieae—Ruelliiinae)

Benoist: 11 (1950); Mapaura (Unpublished).

Sthn trop. Afr. ± 15, Angola, Zimbabwe, and sthn Afr.

Phaulopsis Willd.

(Acanthoideae—Ruellieae—Ruellinae)

Benoist: 10 (1950) as *Phaylopsis*; Binns: 15 (1968) as *Phaylopsis*; Mankeltow: 78 (1996).

Sthn trop. Afr. 10, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Pseuderanthemum Radlk.

(Acanthoideae—Ruellieae—Justiciinae)

Milne-Redhead: 255 (1936); Benoist: 25 (1950); Heine: 167 (1966a); Binns: 15 (1968); Edwards & Harrison: 187 (1998); White *et al.*: 118 (2001); Champluvier: 33 (2002a).

Eranthemum L., in part; Clarke: 169 (1899); Binns: 13 (1968).

Sthn trop. Afr. 5, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Pseudocalyx Radlk.

(Thunbergioideae)

Radlkofer: 416 (1883); Benoist: 149 (1944); Heine: 421 (1963); Heine: 55 (1966a); Breteler: 809 (1994); Breteler: 271 (1998); Schönerberger & Endress: 446 (1998).

Lianes with ± 4-angled, sparsely stellate branchlets. **Leaves** petiolate, ± elliptic, entire to somewhat crenulate. **Inflorescence** an axillary or terminal raceme; bracteoles enveloping calyx and corolla tube. **Calyx** thin, cupular. **Corolla** slightly 2-lipped with contorted lobes; lower lip 3-lobed, upper one 2-lobed. **Androecium**: stamens 4, enclosed, arising ± in middle of corolla tube; anthers 2-theous, opening by apical pores. **Disc** cupular, glabrous. **Gynoecium**: ovary slightly laterally compressed; ovules 2 per locule; stigma 2-lobed. **Capsule** subovoid, beaked. **Seeds** ovoid to dorsally compressed, smooth or warted, not borne on retinacula.

Species 5, trop. Africa, Madagascar; sthn trop. Afr. 1: *Pseudocalyx saccatus* Radlk. (= *P. africanus* S. Moore), Zambia, Zimbabwe, Mozambique. Essentially the genus differs from *Thunbergia* only in the anthers, which dehisce by apical pores, not by longitudinal slits.

Rhinacanthus Nees

(Acanthoideae—Ruellieae—Justiciinae)

Clarke: 224 (1900); Benoist: 26 (1950); Heine: 200 (1966a); Balkwill: 11 (1995); Bingham (Unpublished).

Sthn trop. Afr. 6, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Ruellia L.

(Acanthoideae—Ruellieae—Ruellinae)

Clarke: 44 (1899); Benoist: 8 (1950); Eyles: 483 (1916); Furness & Grant: 231 (1996); Bingham (Unpublished).

Sthn trop. Afr. 8, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Rungia Nees

(Acanthoideae—Ruellieae—Justiciinae)

Nees: 77, 109 (1832); Clarke: 252 (1900); Moore: 138 (1930); Heine: 429 (1963); Heine: 204 (1966a).

Subshrubs, up to 3 m high, pubescent to glabrous. **Leaves** long-petiolate, elliptic-lanceolate, acuminate, entire. **Inflorescence** axillary to terminal strobilate spikes with large membranous, veined bracts arranged in 4 rows of which 2 do not subtend flowers. **Flowers** small, sessile, solitary in axils of bracts and accompanied by 2 large to very small membranous or transparent bracteoles. **Calyx** with 5 subequal pointed teeth, usually membranous or transparent. **Corolla** 2-lipped; tube short, straight, slightly widening towards mouth; upper lip inside in bud, straight, concave, entire or 2-toothed; lower lip usually longer than upper, spreading, 3-lobed. **Stamens** 2, arising in mouth of tube, shorter than upper lip; anthers with 2 separate, slightly displaced thecae, lower one or both spurred; staminodes absent. **Gynoecium** pubescent; stigma slightly 2-lobed; ovules 2 per locule. **Capsule** compressed globose, ovoid or oblong; placentas arising elastically in fruit to throw out seeds. **Seeds** 4, flattened, reniform-suborbicular, rugose.

Species 50, tropical Old World; sthn trop. Afr. 1: *Rungia grandis* T. Anderson, Angola; specimen *Gomes Pedro 4246* (PRE) from Mozambique was identified as *Rungia* sp.

Ruspolia Lindau

(Acanthoideae—Ruellieae—Justiciinae)

Milne-Redhead: 269 (1936); Benoist: 36 (1950).

Eranthemum L., in part; Clarke: 169 (1899).

Sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Ruttya Harv.

(Acanthoideae—Ruellieae—Justiciinae)

Specimen in PRE: *O.B. Miller 7234*; Brummitt (Unpublished).

Sthn trop. Afr. 1: *Ruttya ovata* Harv., Mozambique (specimens in PRE: *O.B. Miller 7234* and others), and sthn Afr.

Sclerochiton Harv.

(Acanthoideae—Acantheae)

Benoist: 24, 36 (1950); Napper: 333 (1970); Vollesen: 1 (1991); Coates Palgrave: 1016 (2002); Mapaura & Timberlake: 161 (2002).

Species 19, tropical and sthn Afr.; sthn trop. Afr. 8, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Staurogyne Wall.

(Nelsonioideae)

Wallich: 80 (1831); Bremekamp: 162 (1955); Champluvier: 98 (1991); Champluvier: 1322, 1328 (1994); Bingham (Unpublished); Phiri (Unpublished).

Erect to ascending forest herbs, usually densely pubescent in upper parts. **Leaves** narrowly elliptic to elliptic-oblong, sometimes obovate, rarely ovate, entire, petiolate. **Inflorescences** terminal or sometimes terminal and axillary, spicate; bracts narrowly elliptic to linear-elliptic, acuminate; bracteoles linear-elliptic. **Calyx** almost free to base, posterior one broader than others. **Corolla** 2-

lipped; upper lip 2-lobed with lobes divided by a notch; lower lip 3-lobed. **Androecium:** stamens 4, didynamous, rarely 2, included or hardly exerted; anthers 2-theous, thecae \pm parallel, \pm mucronate at base, opening by longitudinal slits; staminode small or absent. **Gynoecium:** ovary ellipsoid-cylindric, with 8–14 ovules per locule in 2 rows; style glabrous; stigma unequally 2-lobed. **Capsule** slightly compressed, \pm ovoid-conical; retinacula 0. **Seeds** subglobose, without hairs.

Species \pm 140, pantropical, 5 in Africa; stn trop. Afr. 1: *Staurogyne letestuana* Benoist, Angola (Cabinda); Zambia.

Stenandrium Nees

(Acanthoideae—Acantheae)

Nees: 444 (1836); Vollesen: 169 (1992).

Stenandriopsis S.Moore; Benoist: 25 (1950); Heine: 99 (1966a).

Perennial herbs or shrubs. **Leaves** opposite, elliptic to obovate; apex subacute to long-acuminate; base cordate to decurrent on petiole; margin entire to shallowly crenate. **Inflorescence** dense or lax terminal or axillary spikes; bracts imbricate or not, lower usually sterile; bracteoles 2, glumaceous, linear to narrowly ovate. **Calyx** divided almost to base into 5 sepals, thickened and horny at base. **Corolla** 2-lipped; tube cylindric, straight or slightly curved; upper lip 2-lobed; lower lip 3-lobed. **Androecium:** stamens 4, included; filaments filiform; anthers 1-theous, oblong with apiculate tip; staminode sometimes present. **Gynoecium:** ovary with 2 ovules per locule; style filiform; stigma \pm distinctly 2-lobed. **Capsule** 4-seeded, oblong-ellipsoid, sessile, glumaceous, beaked. **Seeds** discoid, tuberculate.

Species \pm 50, stn USA to Argentina and Chile, 8 in trop. Africa, 10 in Madagascar; stn trop. Afr. 2, Angola (Cabinda).

Strobilanthis S.Moore

(Acanthoideae—Ruellieae—Ruelliiinae)

Moore: 202 (1900); Milne-Redhead: 344 (1932).

Pseudacanthopale Benoist: 9 (1950).

Densely branched, glandular undershrubs with unpleasant smell. **Leaves** ranging in size from large on primary shoots to small on tertiary shoots, entire. **Flowers** solitary or few. **Calyx** divided almost to base into 5 linear segments. **Corolla** obscurely 2-lipped, contorted in bud; lobes subequal, lilac; throat orange. **Androecium:** stamens 4, didynamous; anthers 2-theous, similar, not spurred. **Disc** shortly cup-shaped. **Gynoecium:** capsule with 2 ovules per locule, only upper one developing into a seed. **Capsule** oblong, 2-seeded. **Seeds** with hygroscopic hairs.

Species 5, trop. Africa; stn trop. Afr. 2, Angola, Zambia, Zimbabwe, Malawi.

Thomandersia Baill.

[To be excluded from Acanthaceae—see Scotland & Vollesen: 572 (2000)]. Baillon: 456 (1891); Bremekamp: 166 (1942); Heine: 143 (1966a); Heine: 207 (1966b); Wortley: 4 (2003).

Arborescent shrubs or small trees; upper branches \pm dichotomous. **Leaves** petiolate, oval-elliptic, cuneate at base. **Inflorescence:** terminal or subterminal racemes; flowers \pm oppo-

site, verticillate or scattered; bracts subulate-acicular; bracteoles scale-like at base of calyx. **Calyx** regular to slightly irregular, with an adaxial glandular swelling; lobes short. **Corolla** 2-lipped; lobes 5; tube \pm cylindric; white or faintly rose-purple. **Androecium:** stamens 4, didynamous; filaments basally fused to corolla; anthers 2-theate, parallel, arising at same level; staminode minute. **Disc** thin. **Gynoecium:** ovary 2-locular, subglobose; 2 ovules per locule; style filiform; stigma cylindric. **Capsule** subglobose to ellipsoid, glabrous, surrounded at base by accrescent calyx. **Seeds** 2 per locule, ovoid-ellipsoid, somewhat flattened, resembling a small pine cone due to scale-like testa markings.

Species 6, trop. Africa; stn trop. Afr. 1: *Thomandersia hensii* De Wild. & T.Durand, Angola.

Thunbergia Retz.

(Thunbergioideae)

Benoist: 6, 33 (1950); Heine: 58 (1966a); Binns: 16 (1968); Schönenberger & Endress: 446 (1998); White *et al.*: 119 (2001).

Stn trop. Afr. \pm 40, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and stn Afr.

Whitfieldia Hook.

(Unplaced within Acanthoideae)

Hooker: t. 4155 (1845); Clarke: 65 (1899); Benoist: 8 (1950); White: 383 (1962); Heine: 32 (1966a); Furness & Vollesen: 729 (1991); Bingham (Unpublished); Phiri (Unpublished).

Shrubs, nearly glabrous except inflorescence. **Leaves** \pm elliptic, acuminate at both ends, petiolate, margins entire. **Inflorescences** racemose, spicate or \pm paniculate; bracts large or small; bracteoles large, membranous, often coloured. **Calyx** divided almost to base into 5 subequal, narrowly oblong, petaloid sepals. **Corolla** with 5 subequal lobes; tube long and narrowly cylindric or shorter and dilated nearly from base. **Androecium:** stamens 4, subsimilar, didynamous, included; anthers 2-theous with thecae parallel and muticous at base. **Gynoecium:** ovary glabrous; ovules 2 per locule; stigma capitate to obscurely 2-lobed. **Capsule** stalked, 2- or 4-seeded. **Seeds** discoid, nearly smooth, hairless.

Species 10, trop. Africa; stn trop. Afr. 2, Angola, Zambia.

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Achariaceae
(in broad sense) (including Kiggelariaceae)
(Dilleniidae—Violales)
(Eurosids I—Malpighiales)

Trees or shrubs, usually containing cyanogenic glucosides. **Leaves** alternate, simple, entire or toothed, teeth not salicoid; stipules present or 0. **Inflorescence**: axillary racemes, sometimes spike-like cymes, cymose panicles, fascicles, or flowers solitary. **Flowers** unisexual or bisexual, regular, variously sized. **Sepals** 3–5, free to partly fused at base, sometimes unequal, sometimes spirally arranged and similar to petals, or sepals and petals in distinct whorls. **Petals** (4)5–14, free, often with an adnate adaxial scale; when arranged in whorls and clearly distinct from sepals, then often larger and more numerous than sepals. **Disc** and glands usually absent. **Stamens** (5)–8–many, free; anthers mostly relatively large and linear or oblong, 2-

thecous, opening by longitudinal slits or sometimes terminal pores. **Ovary** superior or rarely half-inferior, 1-locular with several to many ovules on (2)3–8 parietal placentas; style 1, simple and subentire to ± deeply divided into (2)3–8 branches. **Fruit** a capsule dehiscing with 3–8 valves, sometimes woody and dehiscing very tardily, sometimes with 4–6(–8) wings. **Seeds** several to many, sometimes arillate and sometimes pubescent; endosperm usually copious; embryo straight with broad cotyledons.

Sthn trop. Afr.: genera 10, species 19.

Archer, R.H. in Leistner: 45 (2000), under Flacourtiaceae.

Chase *et al.*: 171 (2002). See under Flacourtiaceae (in broad sense) for a discussion on the breaking up of that family.

Key to genera

- 1a Sepals 4 or 5; petals ± as many as sepals; stamens 8–many:
- 2a Petals whorled (cyclically arranged); stamens 8–12 **Kiggelaria**
- 2b Petals spirally arranged; stamens either 5 or 16 or more:
- 3a Stamens 5 **Scottellia**
- 3b Stamens 16 or more:
- 4a Sepals free, ± half as large as petals; racemes subspicate, rather short **Rawsonia**
- 4b Sepals connate in lower third, ± as large as petals; racemes slender, elongate **Dasylepis**
- 1b Sepals 3; petals more than sepals; stamens many:
- 5a Fruit with 4–6 crenate membranous wings:
- 6a Petals 5–7; style short, with (2)3(4) ± horizontally diverging stigmas as long as or longer than style **Grandidiera**
- 6b Petals 10–12; style simple, entire **Poggea**
- 5b Fruit a capsule, often woody, or indehiscent, smooth or with spines or soft bristles:
- 7a Sepals valvate; fruit echinate with branching soft bristles or spines **Buchnerodendron**
- 7b Sepals imbricate; fruit smooth, or with simple bristles or spines:
- 8a Style filiform, entire, rarely shortly divided; fruit 1–3-seeded **Lindackeria**
- 8b Style with 5–8 stigmatic lobes or branches; fruit many-seeded:
- 9a Fruit with a thick woody pericarp; petiole not swollen distally **Xylotheca**
- 9b Fruit a capsule with a leathery or fibrous pericarp; petiole swollen distally **Caloncoba**

Buchnerodendron Gürke

(Lindackerieae)

Gürke: 151 (1893); Exell & Mendonça: 84 (1937/1951); Wild: 267 (1960); Wild & Midgal: 7 (1973); Sleumer: 289 (1974b); Sleumer: 13 (1975); Hul: 39 (1995).

Unarmed small bushes; sometimes dioecious; branches stiffly erect, golden-tomentose at first, later glabrescent. **Leaves** ovate-oblong, broadly ovate or obovate, base cordate, margins serrate; petiolate with ± caducous stipules. **Flowers** in axillary, cymose panicles, racemes or fascicles, bisexual or unisexual. **Sepals** 3, subvalvate, free to base. **Petals** 6–12, imbricate, larger than sepals. **Stamens** very many, in two series, outer somewhat longer than inner ones; filaments slender, rather short; anthers linear, dehiscing by slits. **Ovary** 1-locular, with 3–5 parietal, multi-ovulate placentas; style simple, apex subentire. **Fruit** a globose, tardily dehiscent (? or indehiscent), echinate capsule splitting into 3–5 longitudinal valves. **Seeds** moderately numerous, ovoid or compressed, with a crustaceous testa, arillate at base, sometimes pubescent; embryo straight, cotyledons foliaceous, ovate.

Species 2, trop. Africa; sthn trop. Afr. 2, Angola (Cabinda), Mozambique.

Caloncoba Gilg

(Lindackerieae)

Gilg: 458 (1908); Exell: 20 (1926); White: 265 (1962); Wild & Vidigal: 10 (1973); Sleumer: 120 (1974a); Sleumer: 21 (1975); Hul: 40 (1995) sinks the genus under *Oncoba*; White *et al.*: 266 (2001).

Small shrubs or small to medium trees with unarmed branches. **Leaves** on long petioles or almost sessile; lamina glabrous, scaly or hairy, sometimes glandular-punctate; stipules caducous. **Flowers** often large, in axillary fascicles or solitary, bisexual and male, often appearing before leaves. **Sepals** 3, imbricate, concave. **Petals** 8–12, larger than sepals. **Stamens** many, with linear or sagittate-linear anthers dehiscing by slits or pores. **Ovary** 1-locular with 5–8 multi-ovulate placentas; style simple with 5–8 distinct stigmas, or stigmatic apex only slightly lobed and somewhat peltate. **Fruit** an echinate or smooth, dehiscent, ovoid, globose or ellipsoid capsule splitting into 5–8 valves, many-seeded and sometimes with a fleshy or gelatinous pulp.

Species ± 8, trop. Africa; sthn trop. Afr. 3, Angola, Zambia, Malawi, Mozambique.

Dasylepis Oliv.

(Erythrospermeae)

Olivier: 170 (1865); Burt Davy & Hoyle: 54 (1958); Wild: 263 (1960); Sleumer: 6 (1975).

Trees with glabrous vegetative parts; branches slender, dark brown, striate. **Leaves** entire or serrulate, often somewhat undulate, petiolate with caducous stipules. **Flowers** bisexual or male by abortion, in lax racemes or crowded and ± spicate. **Sepals** 4 or 5, almost free, outer ones scarcely smaller, usually orbicular. **Petals** 4–7, imbricate like inner sepals but larger, with thick hairy scales adnate at base within. **Stamens** indefinite, free; anthers linear to narrowly lanceolate, dehiscing longitudinally. **Ovary** free, glabrous or hairy, 1-locular with 2–4

multi-ovulate placentas; style short or long, simple or divided in upper half into 2–4 branches ending in short stigmas. **Fruit** a globose capsule with hard leathery pericarp; style persistent, splitting into 2–4 longitudinal sections. **Seeds** few.

Species 6, trop. Africa; sthn trop. Afr. 1: *Dasylepis burtt-davyi* Edlin, endemic, as far as is known, to Mt Mlanje, Malawi.

Grandidiera Jaub.

(Lindackerieae)

Jaubert: 467 (1866); Wild & Vidigal: 8 (1973); Sleumer: 11 (1975).

Shrubs or trees. **Leaves** alternate, persistent, petiolate, oblanceolate to obovate, entire or undulate, penninerved; stipules subulate, pubescent. **Flowers** unisexual or bisexual; bisexual flowers with slightly larger sepals and petals and with fewer (35–50) stamens than male flowers. **Inflorescences** short, axillary, few-flowered, spike-like, shortly hairy racemes from upper axils; terminal flower bisexual, lower flowers male; subtending bracts several, membranous, small. **Sepals** 3, imbricate, small. **Petals** 5–7, imbricate, small. **Stamens** many; filaments filiform; anthers dorsifixed near base, longitudinally dehiscent. **Ovary** 1-locular, with 2–4 multi-ovulate parietal placentas, sessile, shortly 4–6(–8)-winged; style short; stigmas (2)3(4), horizontally divergent. **Fruit** globular, woody, tardily dehiscent, with 4–6(–8) short, membranous, crenate wings. **Seeds** many, ovoid, small.

Monotypic genus: *Grandidiera boivinii* Jaub., eastern trop. Africa; sthn trop. Afr.: Mozambique.

Kiggelaria L.

(Pangieae)

Wild: 265 (1960); Wild & Midigal: 5 (1973); Sleumer: 31 (1975); Killick: 60 (1976); White *et al.*: 273 (2001); Coates Palgrave: 751 (2002).

Sthn trop. Afr. 1: *Kiggelaria africana* L., Zimbabwe, Malawi, Mozambique, and sthn Afr.

Lindackeria C.Presl

(Lindackerieae)

Presl: 89, t. 65 (1835); Sleumer: 83, 361 (1937/1951); Wild: 267 (1960); White: 266 (1962); Sleumer: 311 (1974d); Sleumer: 24 (1975); Killick: 60 (1976); Hul: 40 (1995) sinks the genus under *Oncoba*; White *et al.*: 274 (2001).

Unarmed shrubs or trees. **Leaves** simple; lamina usually rather large, glabrous or hairy, hairs stellate or simple, margins usually toothed; petioles sometimes elongate; stipules present. **Flowers** bisexual or male by abortion, in racemes or solitary in axils. **Sepals** 3, imbricate, concave. **Petals** 6–12, imbricate, not much longer than sepals. **Stamens** many; filaments slender, free or rarely connate in a tube; anthers linear. **Ovary** shortly stalked, smooth, tuberculate or shortly echinate, usually hairy, 1-locular with 3 parietal placentas; placentas multi-ovulate or with relatively few ovules; style simple with inconspicuous stigmas. **Fruit** a globose, woody, echinate or warted capsule dehiscing tardily into 3 longitudinal valves. **Seeds** 1–3, with copious endosperm and a large embryo with flat, cordate cotyledons.

Species 13, trop. Africa; sthn trop. Afr. 4, Angola, Zambia, Malawi.

Poggea Gürke

(Lindackerieae)

Gürke: 162 (1893); Sleumer: 80, 360 (1937/1951); Bamps: 11 (1968); Sleumer: 296 (1974c); Hul: 35 (1995).

Unarmed shrubs. **Leaves** alternate, petiolate, obovate, attenuate towards base, acuminate at apex, denticulate, papyraceous; stipules lanceolate, pubescent, persistent. **Flowers** bisexual, solitary in axils of upper leaves; peduncle pubescent. **Sepals** 3, imbricate, oblong to suborbicular, tomentose outside, glabrous inside. **Petals** 10–12, obovate, puberulous inside. **Stamens** many; filaments filiform, glabrous; anthers longitudinally dehiscent. **Ovary** superior, 1-locular, with 2–5 multi-ovulate parietal placentas; style simple, entire, persistent in fruit, glabrescent. **Capsules** ovoid, with 4–6 broad coriaceous wings, tardily dehiscent. **Seeds** many, ovoid, angular, finely pubescent.

Species 3, trop. Africa; sthn trop. Afr. 2, Angola.

Rawsonia Harv. & Sond.

(Erythrospermeae)

Sleumer: 79 (1937/1951); Wild: 262 (1960); Wild & Vidigal: 3 (1973); Killick: 54 (1976); White *et al.*: 276 (2001); Coates Palgrave: 748 (2002); Msekandiana & Mlangeni: 41 (2002); Lebrun & Stork: 420 (2003); Mapaura (Unpublished).

Sthn trop. Afr. 2, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Scottellia Oliv.

(Erythrospermeae)

Olivier: t. 2265 (1893); Sleumer: 79 (1937/1951); Bamps: 9 (1968); Sleumer: 275 (1972); Hul: 32 (1995).

Dasypetalum Pierre ex A.Chev.

Trees up to 30 m high; trunk straight, slightly fluted; branchlets glabrous. **Leaves** alternate, persistent, simple, entire to crenulate, petiolate, cuneate at base, acuminate at apex, coriaceous, glabrous, with 5–8 pairs of secondary nerves; petiole thickened at both ends; stipules 0. **Inflorescences**: racemes grouped in pseudopanicles, axillary; rachis slender to subfiliform; bracts minute, caducous. **Flowers** bisexual. **Sepals** 5, elliptic-ovate, ciliate. **Petals** 5, similar in size to sepals but usually thinner, oblong-ovate to elliptic-obovate, each with a basal scale-like hairy appendage. **Stamens** 5, alternating with petals; filaments linear-subulate, ± twice as long as anthers; anthers acutely triangular in outline, deeply bifid up to basal attachment of filament, longitudinally dehiscent. **Ovary** substipitate, glabrous, 1-locular with 3 pluri-ovulate parietal placentas; style short, shortly trifid at apex. **Fruit** a subglobose capsule splitting into 3 eventually ± reflexed valves; pericarp coriaceous to almost woody, pustular or verruculose outside, smooth or wrinkled inside. **Seeds** 1 or 2(3), subglobose-angular, smooth, covered by a thin bright red or orange-red arillus.

Species 3, tropical (mainly W) Africa; sthn trop. Afr. 1: *Scottellia klaineana* Pierre (= *S. gossweileri* Exell), Angola.

Xylothea Hochst.

(Lindackerieae)

Sleumer: 81 (1937/1951); Wild: 272 (1960); Wild & Vidigal: 11 (1973);

Sleumer: 18 (1975); Killick: 58 (1976); Coates Palgrave: 750 (2002).

Sthn trop. Afr. 2, Angola, Zimbabwe, Malawi, Mozambique, and sthn Afr.

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Aizoaceae (including Tetragoniaceae) (Caryophyllidae—Caryophyllales) (Core Eudicots—Caryophyllales)

Dreyer, L.L. & Jordaan, M. in Leistner: 46 (2000) with key to all local genera.

Sthn trop. Afr.: genera 7, species 25.

Aizoanthemum Dinter ex Friedrich

Gonçalves: 330 (1970); Hartmann: 28 (2002a).

Sthn trop. Afr. 1: *Aizoon mossamedense* (Welw. ex Oliv.) Friedrich, Angola, and sthn Afr.

Aizoon L.

Gonçalves: 330 (1970); Gonçalves: 509 (1978a); Gonçalves: 1 (1979a); Hartmann: 30 (2002a).

Sthn trop. Afr. 2, Angola, Zimbabwe, Mozambique, and sthn Afr.

Galenia L.

Gonçalves: 331 (1970); Gonçalves: 511 (1978a); Hartmann: 28 (2002b).

Sthn trop. Afr. 2, Angola, Zimbabwe, and sthn Afr.

Sesuvium L.

Gonçalves: 322 (1970); Gonçalves: 514 (1978a); Gonçalves: 4 (1979a);

Hartmann: 296 (2002b); Lebrun & Stork: 266 (2003).

Sthn trop. Afr. 7, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Tetragonia L.

Gonçalves: 333 (1970); Gonçalves: 553 (1978b) under Tetragoniaceae; Gonçalves: 1 (1979b); Hartmann: 316 (2002b).

Sthn trop. Afr. 3: 2 indigenous in Angola and Mozambique, and **T. tetragonoides* (Pall.) Kuntze, native of New Zealand, cultivated and naturalised in Angola and Mozambique.

Trianthema L.

Gonçalves: 327 (1970); Gonçalves: 516 (1978a); Gonçalves: 6 (1979a); Hartmann: 330 (2002b).

Sthn trop. Afr. 4, Angola, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Zaleya Burm.f.

Gonçalves: 329 (1970); Gonçalves: 520 (1978a); Gonçalves: 12 (1979a); Hartmann: 351 (2002b).

Sthn trop. Afr. 1: *Zaleya pentandra* (L.) Jeffrey, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

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Alangiaceae

(Asteridae—Cornales)

(Asterids—Cornales; included in Cornaceae)

Trees; twigs pubescent to glabrescent. **Leaves** alternate, simple, entire to undulate, often asymmetric at base, 5- to 7-nerved from base; stipules 0. **Flowers** bisexual, regular, in few-flowered axillary cymes with articulated pedicels; buds flask-shaped. **Calyx**: tube ± funnel-shaped; limb spreading, with 5–8 teeth. **Petals** 5–8, free or slightly coherent at base, strap-shaped, pubescent outside. **Stamens** as many as and alternating with petals, free or slightly cohering at base, with a fringe of hairs on inside; anthers 2-theous, linear, basifixed, introrse, opening longitudinally. **Disc** subglobose, above ovary at base of style. **Ovary** inferior, 1- or 2-locular with 1 anatropous, unitegmic, pendulous ovary from apex of each locule; style 1, cylindrical; stigma slightly lobed. **Fruit** a small, 1- or 2-seeded, ± globose drupe crowned by remnants of disc and sepals. **Seeds** 1 per locule; endosperm abundant, oily; embryo large, straight.

Genus 1, species 21, Old World tropics; sthn trop. Afr. 1.

Candolle: 203 (1828); Verdcourt: 1 (1958); Cannon: 363 (1978); Takhtajan: 383 (1997).

Alangium Lam.

Lamarck: 174 (1783) name conserved; Cannon: 363 (1970); Cannon: 633 (1978); Dowsett-Lemaire & White: 75 (1990); White *et al.*: 121 (2001); Coates Palgrave: 857 (2002); Mapaura & Timberlake: 161 (2002).

Description as for family.

Species 21, trop. Africa, Madagascar, eastern and tropical Asia to eastern Australia and New Caledonia; sthn trop. Afr. 1: *Alangium chinense* (Lour.) Harms, Angola, Zambia, Zimbabwe, Malawi, Mozambique.

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Amaranthaceae

(Caryophyllidae—Caryophyllales)

(Core Eudicots—Caryophyllales; including Chenopodiaceae)

Jordaan, M. in Leistner: 49 (2000).

Identification of additional genera using the key in the above reference:

Blutaparon: runs to *Gomphrena* from which it differs in having the inner 3 tepals smaller than the outer 2 and in flowers which are strongly compressed, with carinate tepals with tips incurved towards the stigmas.

Centemopsis: runs to *Achyroopsis* from which it differs in its linear to filiform (not elliptic to ovate) leaves.

Mechowia: specimens with alternate leaves run to *Sericocoma* from which they differ in having glabrous (not hairy) tepals; specimens with opposite leaves run to *Achyroopsis* from which they differ in having densely hairy (not glabrous) ovaries.

Sericostachys: runs somewhat uncomfortably to *Pandiaka* from which it differs in having broad panicles, and sterile flowers formed of long plumose hairs alongside the fertile ones.

Sthn trop. Afr.: genera 25, species 99.

Achyranthes L.

Townsend: 105 (1988).

Sthn trop. Afr. 1: *Achyranthes aspera* L. with 3 varieties, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Achyropsis (Moq.) Hook.f.

Townsend: 110 (1988).

Sthn trop. Afr. 3, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Aerva Forssk.

Townsend: 93 (1988).

Sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

***Alternanthera** Forssk.

Townsend: 121 (1985); Townsend: 124 (1988).

Sthn trop. Afr. 5, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Amaranthus L.

Brown: 414 (1810); Townsend: 45 (1988).

Sthn trop. Afr. 12, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Blutaparon Raf.

Rafinesque: 45 (1838); Mears: 111 (1982); Townsend: 90 (1993).

Philoxerus not of R.Br.; Keay: 153 (1954); Cavaco: 167 (1962).

Mat-forming, glabrous, fleshy herbs. **Leaves** opposite, linear to narrowly spatulate, amplexicaul at base. **Inflorescence** axillary or terminal, dense, capitate or cylindrical spikes. **Flowers** bisexual, strongly dorsally compressed, subtended by white, 1-nerved bracts. **Tepals** 5, inner 2 smaller and concave. **Stamens** 5; filaments widening and fused into a cup below; anthers 1-theous; pseudostaminodes absent. **Ovary** 1-ovulate; style very short; stigmas 2, filiform. **Capsule** thin-walled, indehiscent.

Species 4, tropical America, W Africa and Japan; sthn trop. Afr. 1: *Blutaparon vermiculare* (L.) Mears, Angola.

Celosia L.

Townsend: 1 (1975); Townsend: 81 (1982); Townsend: 30 (1988); Bingham & Smith: 140 (2002); Izidine & Bandeira: 49 (2002).

Sthn trop. Afr. 17, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Centema Hook.f.

Townsend: 70 (1988).

Sthn trop. Afr. 2, Angola, Mozambique, and sthn Afr.

Centemopsis Schinz

Schinz: 242 (1911); Cavaco: 71 (1962); Townsend: 74 (1988); Townsend: 83 (1993).

Achyropsis (Moq.) Hook.f., in part; *Psilotrichum* Blume, in part; *Robynsiella* Suess.

Annuals or short-lived perennials with tough, wiry stems. **Leaves** opposite, ± linear, entire. **Inflorescences** spiciform to capitate or cymose-fastigiate; bracts persistent, each subtending 1 or 2 flowers; bracteoles and perianth falling with fruit. **Flowers** bisexual. **Tepals** 5, indurate and ± coalescent at base in fruit, glabrous to sparingly floccose in lower half. **Stamens** 5, shortly fused at base, alternating with fringed staminodes; anthers 2-theous. **Ovary** uni-ovulate, glabrous to thinly hairy; style slender; stigma capitate. **Capsule** thin-walled, indehiscent.

Species 11, trop. Africa; sthn trop. Afr. 5, Angola, Zambia, Zimbabwe, Malawi, Mozambique.

Centrostachys Wall.

Cavaco: 149 (1962) under *Achyropsis*; Townsend: 109 (1988).

Monotypic genus: *Centrostachys aquatica* (R.Br.) Wall. ex Moq., sthn trop. Afr.: Zambia, Zimbabwe, Mozambique, and sthn Afr.

Cyathula Blume

Cavaco: 84 (1962); Townsend: 79 (1988).

Sthn trop. Afr. 8, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

***Gomphrena** L.

Cavaco: 164 (1962); Townsend: 130 (1988).

Sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr., widespread introduced weeds.

***Guilleminea** Kunth

Townsend: 122 (1988).

Brayulinea Small; Cavaco: 156 (1962).

Sthn trop. Afr. 1: **Guilleminea densa* (Willd.) Moq., Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr., widespread tropical weed, native of the Americas.

Hermestaedia Rchb.

Townsend: 81 (1982); Townsend: 39 (1988); Lebrun & Stork: 314 (2003).

Sthn trop. Afr. 8, Angola, Zambia, Zimbabwe, Mozambique, and sthn Afr.

Kyphocarpa (Fenzl) Lopr.

Cavaco: 70 (1962); Townsend: 62 (1988).

Sthn trop. Afr. 2, Angola, Zambia, Zimbabwe, Mozambique, and sthn Afr.

Leucosphaera Gilg

Townsend: 72 (1988).

Monotypic genus: *Leucosphaera bainesii* (Hook.f.) Gilg, Angola, Zimbabwe, and sthn Afr.

Marcelliopsis Schinz

Cavaco: 93 (1962); Lebrun & Stork: 316 (2003).

Sthn trop. Afr. 2, Angola, and sthn Afr.

Mechowia Schinz

Schinz: 105, 110 (1893); Cavaco: 108 (1962); Townsend: 99 (1988); Townsend: 86 (1993).

Perennial herbs with a stout rootstock and slender erect stems. **Leaves** opposite to alternate, broadly elliptic to almost filiform, entire. **Inflorescences** capitate, dense; bracts each subtending 1 flower, persistent after fruit falls; bracteoles deciduous with fruiting perianth. **Flowers** bisexual. **Tepals** 5, 3–5-nerved, free, glabrous. **Stamens** 5; filaments free, delicate, flattened; pseudostaminodes tooth-like or notched, alternating with stamens; anthers 2-theous. **Ovary** uni-ovulate, densely lanate at least in upper two-thirds; style elongate; stigma capitate. **Capsule** thin-walled, irregularly dehiscent. **Seeds** somewhat compressed, yellow or reddish.

Species 2, Central Africa; sthn trop. Afr. 2, Angola, Zambia.

Nelsia Schinz

Bamps: 71 (1975); Townsend: 65 (1988).

Sthn trop. Afr. 2, Angola, and sthn Afr.

Nothosaerva Wight

Townsend: 97 (1988).

Monotypic genus: *Nothosaerva brachiata* (L.) Wight; sthn trop. Afr.: Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Pandiaka (Moq.) Hook.f.

Cavaco: 129 (1962); Townsend: 115 (1988); Townsend: 87 (1993).

Sthn trop. Afr. 9, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Psilotrichum Blume

Townsend: 101 (1988).

Sthn trop. Afr. 4, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Pupalia Juss.

Cavaco: 90, 220 (1962); Townsend: 88 (1988).

Sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Sericorema (Hook.f.) Lopr.

Townsend: 67 (1988).

Sthn trop. Afr. 2, Angola, Zimbabwe, and sthn Afr.

Sericostachys Gilg & Lopr.Townsend: 42 (1985); Townsend: 60 (1988); White *et al.*: 121 (2001).

High-scandent perennials with opposite branches. **Leaves** opposite, broadly ovate to lanceolate-ovate, entire; indumentum of jointed, barbellate hairs. **Inflorescence** a broad panicle with spike-like branches; each persistent bract subtending a central, bisexual, fertile and 2 lateral sterile flowers, consisting of several hair-like appendages, elongating and imparting to infructescence branches a Clematis-like look. **Fertile flowers** bisexual, with 2 greatly accrescent bracteoles. **Tepals** 5, free, ± pilose. **Stamens** 5, very shortly fused into a disc-like rim at extreme base, alternating with very small pseudostaminodes; anthers 2-theous. **Ovary** uni-ovulate, glabrous; style slender; stigma capitate. **Capsule** thin-walled, indehiscent, enclosed by and falling with persistent perianth and bracteoles.

Monotypic: *Sericostachys scandens* Gilg & Lopr., trop. Africa; sthn trop. Afr.: Angola, Malawi.

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Anacardiaceae
(Rosidae—Sapindales)
(Eurosids II—Sapindales)

Archer, R.H. in Leistner: 56 (2000).

Sthn trop. Afr.: genera 12, species ± 108.

**Spondias mombin* L., is cultivated and may be subsontaneous in Angola [Exell & Mendonça: 127 (1954/1956)].

Key to genera

[after Fernandes & Fernandes (1966)]

1a Leaves simple:

2a Style and stigma 1; male flowers with 1(2) fertile stamens, and staminodes ± developed; fruits large; leaf lamina glabrous; flowers polygamous:

3a Pedicel and receptacle swollen and fleshy in fruit, finally becoming larger than the fruit; fruit not fleshy, reniform, compressed; stamens 7–10 (usually only 1 fertile) with the filaments connate in a ring at the base ***Anacardium**

3b Pedicel and receptacle not fleshy; drupe ovoid or subglobose, pulpy, stamens 5(10–12), 1(2–5) fertile, the others ± reduced, with the filaments not connate in a ring ***Mangifera**

2b Styles 3, sometimes slightly connate at the base; male flowers with 5 stamens; fertile drupes black and shining, generally somewhat compressed, up to 13 mm broad, leaf lamina ± hairy; flowers dioecious **Ozoroa**

1b Leaves compound (rarely 1-foliolate):

4a Hairs on the inflorescences (and usually on the young leaves) stellate; flowers 4-merous; stamens 8; styles 3 or 4, persistent in fruit **Lansea**

4b Hairs (if present) simple:

5a Leaves 3-foliolate (very rarely 5-foliolate); drupes up to 8 mm in diam., globose or compressed; flowers (4)5(6)-merous with imbricate petals; ovary usually 1-locular and 1-seeded, styles 3; flowers dioecious **Rhus**

5b Leaves pinnate or, if 1–3-foliolate, then drupes ellipsoid or ovoid:

6a Inflorescence spike-like; young leaves dentate; stamens more than 10 **Sclerocarya**

6b Inflorescence paniculate; leaves entire to undulate; stamens 10 or less:

7a Style 1; ovary 1-locular and 1-seeded:

8a Flowers 5-merous, unisexual; stamens 10–20; petals valvate **Sorindeia**

8b Flowers 3-merous, bisexual; stamens 6, unequal; petals imbricate **Haematostaphis**

7b Styles several or stigmas sessile:

9a Ovary 5-locular; styles 5; stamens 10 **Antrocaryon**

9b Ovary 1–4(5)-locular; styles 2–4(5); stamens 4–10:

10a Stamens 4(5); ovary hairy; stigmas 2-lobed **Trichoscypha**

10b Stamens 6–10; ovary glabrous; stigmas truncate:

11a Ovary 3 or 4(5)-locular; flowers 3- or 4(5)-merous; sepals free **Pseudospondias**

11b Ovary 1-locular; flowers 4- or 5-merous; sepals connate below **Harpephyllum**

***Anacardium L.**

Hiern: 175 (1896); Exell & Mendonça: 96 (1954/1956); White: 208 (1962); Fernandes & Fernandes: 551 (1966); Fernandes & Fernandes: 2 (1969); Coates Palgrave: 539 (2002).

Species 11, tropical America; **Anacardium occidentale* L., the Cashew nut tree, is cultivated and is reported naturalised in Angola, Zambia, Zimbabwe and Mozambique, and in sthn Afr.

Antrocaryon Pierre

Pierre: 23 (1898); Engler: 177 (1921); Van der Veken: 63 (1960); Fernandes: 107 (1975).

Tall, dioecious to polygamous trees. **Leaves** alternate, imparipinnate with 5–9 pairs of ± oblong-lanceolate, entire leaflets with rounded base and long-acuminate apex. **Inflorescence** lax, subterminal-axillary panicles. **Male flowers:** calyx with 5 triangular, pubescent sepals; petals 5, oblong-ovate, reflexed, yellowish white; stamens 10, anthers ellipsoid, pistillode minute; disc thick, ± lobed. **Female flowers:** ovary subglobose, with 5 1-ovulate locules; styles 5, short,

subterminal, diverging. **Fruit** a subglobose, somewhat horizontally flattened, weakly 5-lobed drupe with thin fleshy mesocarp and woody endocarp forming a nut with 5 elliptic, subapical operculums corresponding to the 5 locules. **Seeds** 3 or 4 per nut, oblong, flattened, curved; testa thin.

Species 3, trop. Africa; sthn trop. Afr. 1 or 2, Angola.

Haematostaphis Hook.f.

Hooker: 169 (1860); Engler: 186 (1921); Exell: 91 (1928); Exell & Mendonça: 130 (1954/1956); Keay: 733 (1958).

Tall, erect, dioecious trees. **Leaves** alternate, imparipinnate with many leaflets, glabrous, crowded towards ends of branches. **Inflorescence** elongate, laxly branching axillary panicles longer than leaves; flowers small. **Calyx** unequally 3-fid; sepals obtuse. **Petals** 3, obovate-oblong, imbricate. **Stamens** 6, unequal, alternately longer, all fertile. **Ovary** 1(2)-locular; style 1. **Fruit** an oblong, crimson, edible drupe with resinous mesocarp and 1(2)-locular, 1-seeded, bony endocarp. **Seed** pendulous with curved, fleshy cotyledons and a minute radicle.

Species 2, trop. Africa; sthn trop. Afr. 1: *Haematostaphis barteri* Hook.f., Angola.

Harpephyllum Bernh.

Fernandes & Fernandes: 555 (1966); Fernandes & Fernandes: 7 (1969); Coates Palgrave: 540 (2002).

Sthn trop. Afr. 1: *Harpephyllum caffrum* Bernh. in C.Krauss, Zimbabwe, Mozambique, and sthn Afr.; probably introduced from sthn Afr.

Lannea A.Rich.

Exell & Mendonça: 131 (1954/1956); White: 209 (1962); Fernandes & Fernandes: 557 (1966); Fernandes & Fernandes: 8 (1969); Kokwaro: 10 (1986); Coates Palgrave: 541 (2002).

Calesiam Adans.; Hiern: 177 (1896); *Odina* Roxb.; White: 211 (1962) as synonym.

Sthn trop. Afr. 14, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

**Mangifera* L.

Exell & Mendonça: 96 (1954/1956); White: 211 (1962); Fernandes & Fernandes: 552 (1966); Fernandes & Fernandes: 4 (1969); Coates Palgrave: 539 (2002).

Species ± 40–60, Indomalaysia; **Mangifera indica* L., the Mango, is cultivated in all warm regions of the world and is cited from all countries in sthn trop. Afr., and in sthn Afr.; it often becomes naturalised.

Ozoroa Delile

Fernandes & Fernandes: 574 (1966); Fernandes & Fernandes: 22 (1969); Izidine & Bandeira: 49 (2002).

Heeria, in part, not of Meisn.; Meikle: 116 (1954); White: 208 (1962); Coates Palgrave: 548 (2002).

Sthn trop. Afr. 26, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Pseudospondias Engl.

Engler: 258 (1883); Exell & Mendonça: 128 (1954/1956); Fernandes & Fernandes: 555 (1966); Fernandes: 13 (1973).

Dioecious trees or tall shrubs; bole usually short, twisted, strongly buttressed; bark greyish yellow, falling off in large flakes. **Leaves** alternate, imparipinnate, leaflets opposite or alternate, oblong-ovate to elliptic, asymmetric at base, petiolulate, discolorous, sometimes shining, with secondary nerves curved. **Flowers** unisexual, in axillary, much branched and lax, many-flowered panicles. **Male flowers**: sepals 3 or 4(5), imbricate; petals 3 or 4(5), imbricate; stamens 6–8(10), episepalous ones slightly longer, inserted below annular crenulate disc; vestigial ovary 3- or 4-lobulate, at centre of disc. **Female flowers**: ± similar to male ones, with small staminodes; ovary globose, 3- or 4(5)-locular; styles 3 or 4(5), subterminal, very short. **Drupe** oblong-obovoid with resinous mesocarp and woody endocarp, 3- or 4(5)-operculate at apex, usually with only 1 locule fertile. **Seeds** 1(2), oblong; testa thin; cotyledons plano-convex.

Species 2, W and C trop. Africa; sthn trop. Afr. 2, Angola, Zambia. Fruit edible, very sweet.

Rhus L.

Oliver: 436 (1868); Exell & Mendonça: 98 (1954/1956); White: 211 (1962); Fernandes & Fernandes: 590 (1966); Fernandes & Fernandes: 35 (1969); White *et al.*: 122 (2001); Coates Palgrave: 556 (2002).

Sthn trop. Afr. ± 45, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Sclerocarya Hochst.

Oliver: 449 (1868); Exell & Mendonça: 130 (1954/1956); Fernandes & Fernandes: 552 (1966); Fernandes & Fernandes: 5 (1969); Coates Palgrave: 539 (2002).

Sthn trop. Afr. 1: *Sclerocarya birrea* (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Sorindeia Thouars

Thouars: 23 (1806); Exell & Mendonça: 97 (1954/1956); Fernandes & Fernandes: 567 (1966); Fernandes & Fernandes: 17 (1969); White *et al.*: 125 (2001); Coates Palgrave: 544 (2002); Breteler: 93 (2003).

Shrubs, sometimes with stems in form of runners, or trees, dioecious, with light exudate. **Leaves** alternate, imparipinnate or rarely 1-foliolate; leaflets (1)3–7(9), petiolulate; tertiary nerves generally collected into an oblique nerve directed towards angle between midrib and lateral nerves. **Flowers** unisexual, 5-merous, in axillary or terminal branched panicles. **Male flowers**: calyx ± cupuliform, shallowly 5-lobulate or 5-dentate; petals valvate, or sometimes imbricate, longer than calyx; stamens 10–20; filaments subulate, inserted below and on disc; anthers dorsifixed, introrse; disc crenulated, glabrous; pistillode absent. **Female flowers**: perianth similar to male; staminodes usually 5, small; ovary free, 1-locular, ovoid; ovule 1, pendent, apical; style 1; stigma 3-lobed, persisting on fruit. **Drupe** ellipsoid or asymmetrically ovoid; mesocarp thin, fleshy; endocarp chartaceous or woody. **Seed** ellipsoid.

Species 9, trop. Africa, Madagascar, Mascarene and Comoro Islands; sthn trop. Afr. 3, Angola, Zambia, Malawi, Mozambique.

Trichoscypha Hook.f.

Hooker: 423 (1862); Exell & Mendonça: 123 (1954/1956); Van der Veken: 69 (1960); Fernandes & Fernandes: 571 (1966); Fernandes & Fernandes: 20 (1969); Fernandes: 16 (1973); White *et al.*: 125 (2001); Coates Palgrave: 544 (2002); Mapaura & Timberlake: 161 (2002).

Dioecious shrubs or trees; branchlets brownish, striate, lenticellate. **Leaves** alternate, imparipinnate, (1)2–11-foliolate; petiole and rachis brownish; leaflets opposite, subopposite or alternate, concolorous, petiolulate. **Flowers** unisexual, in many-flowered panicles, female ones usually shorter and with thicker axis than in males. **Calyx** shortly cupuliform, with 4(5) triangular-ovate lobes, valvate in bud. **Petals** 4(5), patent, later reflexed, valvate, those of female flowers slightly larger. **Stamens** 4(5), smaller and sterile in female flowers; filaments filiform; anthers dorsifixed. **Disc** cupuliform, ferruginous-hirsute or glabrous. **Ovary** ovoid, 1-locular, 1-ovulate; styles 3 or 4, reflexed or erect, compressed, with 2-lobed stigmas (rarely sessile). **Drupe** ovoid, turbinate or subglobose, appressed-setulose or glabrous; exocarp and mesocarp ± fleshy; endocarp thin, coriaceous or crustaceous. **Seed** ovoid, with very thick cotyledons.

Species 50, trop. Africa; sthn trop. Afr. 5 or 6, Angola, Zambia, Zimbabwe, Malawi, Mozambique.

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Anisophylleaceae

(Rosidae—Rosales)
(Eurosids I—Cucurbitales)

Trees, shrubs or subshrubs, sometimes polygamous, usually glabrous or glabrescent, young shoots often pubescent or pilose; without aerial roots. **Leaves** alternate, generally distichous and horizontally orientated on horizontally growing branches, simple, ± elliptic, entire, often inequilateral, with ± 26 lateral nerves curving up from near base and soon becoming subparallel; petiole short; stipules 0 but often with alternating reduced, stipuliform leaves. **Inflorescences** many-flowered spikes. **Flowers** bisexual or unisexual, regular, small. **Calyx** (3)4 or 5(–7)-lobed; lobes ± erect; tube adnate to ovary. **Petals** usually as many as, and scarcely longer than calyx lobes, free, arising at mouth of calyx tube, lobed or lacinate, rarely entire. **Disc** obscure, crenulated or lobed. **Stamens** twice as many as petals, arising at mouth of calyx tube or epipetalous ones adnate to basal parts of petals; filaments usually unequal in length; anthers 2-theous, dorsifixed, introrse or latrorse, opening by longitudinal slits, didynamous, small. **Ovary** inferior, (3)4(–8)-locular, each locule with 1 apical-axile, pendulous, anatropous, unitegmic, crassinucellate ovule; styles as many as locules, ± free, short, ± thickened below, erect or recurved, arising from disc. **Fruit** an ellipsoid to pyriform drupe, usually 1-locular and 1-seeded. **Seed** with leathery testa; embryo linear to slightly fusiform, longitudinally embedded in seed, cotyledons minute or absent; albumen thick and hard; endosperm 0.

Genera 4, species ± 30, tropics of Old and New World. Anisophylleaceae have often been placed under Rhizophoraceae from which they differ as follows: leaves alternate, often distichous; stipules 0; inflorescences catkin- or spike-like; styles (3)4(–8), ± free (stylocidia). Sthn trop. Afr.: genus 1, species ± 5.

Ridley: 700 (1922); Dahlgren: 1259 (1988); Takhtajan: 278 (1997); Angiosperm Phylogeny Group: 426 (2003).

Anisophyllea R.Br. ex Sabine

Sabine: 446 (1824); Exell: 163 (1928) under Rhizophoraceae; Keay: 281 (1954); Lewis: 16 (1956); Burt Davy *et al.*: 82 (1958) under Rhizophoraceae; White: 275 (1962) under Rhizophoraceae; Mendes: 40 (1970) under Rhizophoraceae; Torre & Gonçalves: 96 (1978) under Rhizophoraceae.

Description as for family.

Species ± 25, tropics of Old World; sthn trop. Afr. ± 5, Angola, Zambia, Malawi.

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Annonaceae
(Magnoliidae—Magnoliales)
(Magnoliids—Magnoliales)

Jordaan, M. in Leistner: 59 (2000).

Sthn trop. Afr.: genera 29, species 101.

Key to genera

[adapted from Kessler (1993)]

- 1a Climbing plants:
- 2a Stellate hairs present:
- 3a Ovules 1 per carpel; monocarps connate **Letestudoxa**
- 3b Ovules many to few per carpel; monocarps free **Uvaria**
- 2b Simple hairs present or plants glabrous:
- 4a Climbers with leaf-opposed, laterally compressed hooks; ovules 2, basal; monocarps free **Artabotrys**
- 4b Climbers without hooks:
- 5a Petals in 2 subequal whorls, or petals in 1 whorl:
- 6a Petals in 1 whorl, 4–6, without appendages at top **Monanthes**
- 6b Petals in 2 whorls:
- 7a Petals, at least outer whorl, valvate **Sphaerocoryne**
- 7b Petals imbricate:
- 8a Androgynophore absent or very short **Afroguatteria**
- 8b Androgynophore up to 13 mm long **Toussaintia**
- 5b Outer petals larger than inner ones:
- 9a Stamens with apex of connective expanded-truncate:
- 10a Stamens 12–15, in 2 whorls; carpels 3 **Exellia**
- 10b Stamens many; carpels many:
- 11a Inner petals slightly shorter than outer ones, not concave at base; sepals persistent in fruit **Sphaerocoryne**
- 11b Inner petals much shorter than outer ones, not concave at base; sepals not persistent in fruit **Friesodielsia**
- 9b Stamens with apex of connective either not enlarged or tongue-shaped or conical, never truncate:
- 12a Anther thecae transversely septate **Neostenanthera**
- 12b Anther thecae not transversely septate **Monanthes**
- 1b Erect trees or shrubs:
- 13a Hairs stellate:
- 14a Petals 3 in 1 whorl **Annickia (=Enantia)**
- 14b Petals 6 in 2 whorls:
- 15a Carpel 1; ovules many **Dielsiothamnus**
- 15b Carpels several; ovules 1 or 2:
- 16a Inner petals caudate at apex; carpels connate at the base, enclosed by the receptacle; ovule 1, basal **Duguetia**
- 16b Inner petals not caudate; carpels free; ovules many to 1, lateral **Uvaria**
- 13b Hairs simple or plants glabrous:
- 17a Petals equal to subequal, mostly in 2 whorls, sometimes in 1:
- 18a Inner petals clawed **Uvariadendron**
- 18b Inner petals not clawed:
- 19a Stamens with an enlarged connective apex, or connective apex tongue-shaped or conical, never truncate:
- 20a Sepals 2, connate to form a bilobed apex; petals 4(3), in 1 whorl **Uvariopsis**
- 20b Sepals 3; petals 6, in 2 whorls:
- 21a Stamens with connective not developed above the anthers, replaced by a tuft of hairs **Mischogyne**
- 21b Stamens with connective apex conical to capitate, tongue-shaped, sometimes toothed:
- 22a Petals transversely folded in bud; monocarps subsessile **Hexalobus**
- 22b Petals not transversely folded; monocarps stipitate **Greenwayodendron**

- 19b Stamens with apex of connective expanded-truncate:
- 23a Petals in 1 whorl:
- 24a Petals 3 **Annona**
- 24b Petals 6; sepals 3 free, carpels united into a 1-locular ovary **Isolona**
- 23b Petals in 2 distinct whorls:
- 25a Fruit formed by the united monocarps **Annona**
- 25b Fruit formed by free monocarps:
- 26a Anther thecae transversely septate **Xylopia**
- 26b Anther thecae not transversely septate:
- 27a Ovule 1, basal **Polyalthia**
- 27b Ovules several, lateral, in two series; petals joined at the base; stigma cushion-shaped **Polyceratocarpus**
- 17b Petals of the 2 whorls dissimilar or 1 whorl missing:
- 28a Outer petals shorter than inner ones **Piptostigma**
- 28b Inner petals shorter than outer ones or inner whorl missing:
- 29a Inner whorl of petals absent **Annona**
- 29b Inner whorl of petals present:
- 30a Inner petals clawed or concave at the base:
- 31a Inner petals clawed:
- 32a Carpels several, united into a conical or globose 1-celled ovary with many ovules and parietal placentation **Monodora**
- 32b Carpels several, free **Monanthotaxis**
- 31b Inner petals concave at the base:
- 33a Anther thecae not transversely septate **Cleistopholis**
- 33b Anther thecae transversely septate:
- 34a Apex of the anther connective expanded-truncate **Xylopia**
- 34b Apex of the anther connective triangular; monocarps stipitate **Neostenanthera**
- 30b Inner petals neither clawed nor concave at base:
- 35a Ovule 1, basal:
- 36a Fruit formed by the united carpels **Anonidium**
- 36b Monocarps free:
- 37a Calyx entire; inner petals not cohering about the reproductive organs **Cleistochlamys**
- 37b Calyx of 3 sepals ± connate at base; inner petals cohering about the reproductive organs:
- 38a Inner petals slightly shorter than outer ones; sepals persistent in fruit **Sphaerocoryne**
- 38b Inner petals much shorter than outer ones; sepals not persistent in fruit **Friesodielsia**
- 35b Ovules many to few, lateral:
- 39a Monocarps sessile; stigma sessile, cushion-shaped; seeds without aril **Polyceratocarpus**
- 39b Monocarps stipitate:
- 40a Inner petals not cohering about the reproductive organs **Uvariastrum**
- 40b Inner petals cohering about the reproductive organs:
- 41a Inner petals slightly shorter than outer ones; sepals persistent in fruit **Sphaerocoryne**
- 41b Inner petals much shorter than outer ones; sepals not persistent in fruit **Friesodielsia**

Afroguatteria Boutique

Boutique: 104 (1951a); Boutique: 298 (1951b); Paiva: 24 (1966); Kessler: 112 (1993); Lebrun & Stork: 22 (2003).

Climber, up to 4 m long, with simple hairs. **Leaves** elliptic-oblong to oblong-obovate, petiolate. **Flowers** bisexual, solitary or in 2-flowered cymes, leaf-opposed; buds subglobose; bracteole 1, caducous. **Sepals** 3, free, valvate. **Petals** 6, imbricate, in 2 whorls, subequal. **Stamens** many, connective with a dilated capitate apex. **Carpels** many, free, cylindrical, ± angular, 1(2)-ovulate. **Fruit** a fusiform, stipitate monocarp.

Species 2, trop. Africa; sthn trop. Afr. 1: *Afroguatteria globosa* Paiva, Angola (Cabinda).

Annickia Setten & Maas

Setten & Maas: 676, 681 (1990).

Enantia Oliver: 174 (1867) not of Falconer (1841) in Sabiaceae; Exell & Mendonça: 26 (1937/1951); Boutique: 386 (1951b); Le Thomas: 300 (1962); Paiva: 97 (1966); Le Thomas: 306 (1969); Kessler: 117 (1993).

Trees with simple, fasciculate or stellate hairs. **Flowers** bisexual, solitary or rarely paired, extra-axillary; buds conical; bracteoles 1 or 2, caducous. **Sepals** 3, free, valvate, lanceolate. **Petals** 3, opposite sepals, free, valvate. **Stamens** many, connective with an ovoid, subpyramidal or truncate, dilated apex. **Carpels** many, free, usually cylindrical, pubescent, with 1 basal ovule. **Fruit** an oblong to ellipsoid, stipitate monocarp.

Species ± 12, trop. Africa; sthn trop. Afr. 2: Angola (Cabinda).

Annona L.

Exell & Mendonça: 27, 356 (1937/1951); Robson: 141 (1960); White: 51 (1962); Paiva: 107 (1966); Paiva: 185 (1983–84); Coates Palgrave: 210 (2002); Lebrun & Stork: 22 (2003).

Sthn trop. Afr.: 3 indigenous, 4 introduced, cultivated and sometimes subsontaneous, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Anonidium Engl. & Diels

Engler & Diels: 50, 56 (1900); Exell & Mendonça: 15 (1937/1951); Paiva:

106 (1966); Le Thomas: 328 (1969); Paiva: 184 (1983–84); Kessler: 126 (1993).

Trees with simple hairs. **Flowers** bisexual or male, in fascicles, cauliflorous; buds subglobose; bracts cucullate; bracteoles 2. **Sepals** 3, connate at base, valvate. **Petals** 6, in 2 whorls, exterior ones valvate, interior ones imbricate. **Stamens** many, thecae linear, extrorse; connective with a truncate, dilated apex. **Carpels** many, with bases included in receptacle; ovule 1, basal. **Fruit** compound, fleshy, \pm globose-ovoid, formed by united monocarps.

Species \pm 5, trop. Africa; sthn trop. Afr. 1: *Anonidium mannii* (Oliv.) Engl. & Diels var. *brieyi* (De Wild.) Fries (= *A. friesianum* Exell), Angola (Cabinda).

Artabotrys R.Br.

Exell & Mendonça: 21, 355 (1937/1951); Robson: 129 (1960); White: 51 (1962); Paiva: 88 (1966); Kessler: 117 (1993); White *et al.*: 127 (2001); Coates Palgrave: 209 (2002); Mapaura & Timberlake: 171 (2002).

Sthn trop. Afr. 8, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Cleistochlamys Oliv.

Oliver: 175 (1867); Robson: 120 (1960); White: 52 (1962); Kessler: 117 (1993); Coates Palgrave: 204 (2002).

Shrub or small tree, erect or straggling, much-branched, with simple hairs; bark pale, flaking. **Leaves** petiolate, narrowly oblong to oblanceolate or obovate. **Flowers** bisexual, solitary, axillary, sessile; buds globose; bracteoles 4 or 5, biseriate, persistent. **Calyx** entire and completely enclosing petals in bud, splitting into 3 (rarely 2) \pm equal sepals, glabrous. **Petals** 6, in two whorls, outer valvate, inner imbricate and somewhat shorter, expanding and spreading at anthesis, free. **Stamens** \pm 30–40, cuneate-quadrangle, with thecae extrorse, divergent and prolongation of connective broadly and obliquely capitate; filaments absent or almost so. **Carpels** 6–10, free, ovoid, with a single basal ovule; style cylindrical, oblique, almost as long as ovary; stigma capitate; ripe carpels indehiscent, succulent, cylindrical, stipitate, 1-seeded. **Seed** vertical; aril absent.

Monotypic genus: *Cleistochlamys kirkii* (Benth.) Oliv. is confined to Tanzania and the adjacent sthn trop. Afr. regions of Zambia, Zimbabwe, Malawi and Mozambique. The genus is near *Monanthataxis*, but is distinguished from it by the entire calyx.

Cleistopholis Pierre ex Engl.

Engler: 160 (1897); Exell & Mendonça: 14 (1937/1951); Paiva: 26 (1966); Le Thomas: 87 (1969); Kessler: 113 (1993).

Trees, glabrous or glabrescent (with simple hairs). **Flowers** bisexual, in fascicles, axillary; buds subglobose or conical. **Sepals** 3, free, valvate. **Petals** 6, in 2 whorls, outer ones valvate, inner ones imbricate, smaller than inner ones. **Stamens** many, sessile; thecae linear, extrorse; connective with a truncate, dilated apex. **Carpels** 10–many, free, oblong-linear, 1- or 2-ovulate. **Mericarps** baccate, subglobose, subsessile. **Seeds** 1 or 2, usually vertical, globose or plano-convex. $x = 7$.

Species 3(4), W trop. Africa; sthn trop. Afr. 2, Angola (Cabinda).

Dielsiothamnus R.E.Fr.

Fries: 35 (1955); Robson: 115 (1960); Kessler: 121 (1993).

Shrubs or small trees, sometimes climbing, with stellate and sparse simple hairs. **Flowers** bisexual (rarely male), solitary, axillary, shortly pedicellate; buds globose; bracteoles 2, enclosing bud. **Sepals** 3, valvate, enclosing petals in bud. **Petals** 6, in 2 whorls, both valvate, free, outer whorl slightly larger. **Stamens** many, linear-obconic with thecae lateral and connective-prolongations obliquely capitate, apiculate; filaments short. **Carpel** solitary, cylindrical, with many ovules in two rows; style absent; stigma bilobed; ripe carpel indehiscent, sessile or subsessile, many-seeded. **Seeds** horizontal; aril absent.

Monotypic genus: *Dielsiothamnus divaricatus* (Diels) R.E.Fr. is apparently restricted to Tanzania in trop. Africa, and to Malawi and Mozambique in sthn trop. Afr. The genus has affinities with *Uvaria* and *Hexalobus*.

Duguetia A.St-Hil.

Saint-Hilaire: 35 (1824); Kessler: 127 (1993); Chatrou *et al.*: 234 (2000); Lebrun & Stork: 30 (2003).

Pachypodanthium Engl. & Diels: 50, 55 (1900) in part; Paiva: 29 (1966); Le Thomas: 102 (1969); Kessler: 127 (1993).

Trees with stellate hairs. **Flowers** bisexual, solitary, paired or in few-flowered fascicles on short thick branches; bracts many, caducous; receptacle conical. **Sepals** 3, valvate, free. **Petals** 6, in 2 whorls, imbricate, inner slightly shorter than outer ones and caudate at apex. **Stamens** many, connective truncate at apex. **Carpels** many, connate at base and enclosed by receptacle; ovule 1, basal. **Fruit** a globose, to subglobose-ellipsoid syncarp composed of united monocarps.

Species \pm 100, tropics of the New World and W Africa; sthn trop. Afr. 1: *Duguetia confinis* (Engl. & Diels) Chatrou, Angola (Cabinda).

Exellia Boutique

Boutique: 117 (1951a); Exell & Mendonça: 356 (1937/1951); Paiva: 46 (1966); Le Thomas: 262 (1969); Kessler: 115 (1993).

Climbers with simple hairs. **Flowers** unisexual, solitary or paired, axillary or extra-axillary, rarely terminal; buds subglobular; bracteoles 1. **Sepals** 3, valvate, \pm united at base, much smaller than petals. **Petals** 6, free, valvate, in 2 whorls, inner ones smaller than outer ones, shortly clawed. **Stamens** 12–15, in 2 whorls; thecae lateral, longitudinally dehiscent; connective with truncate dilated apex. **Carpels** 3, free, cylindrical-obconical; ovules 15–20, in 2 series; style absent; stigma conical. **Monocarps** 1(–3), globose, indehiscent, sessile, many-seeded.

Monotypic: *Exellia scamnopenetala* (Exell) Boutique, W Africa; sthn trop. Afr.: Angola (Cabinda).

Friesodielsia Steenis

Le Thomas: 233 (1969); Verdcourt: 17 (1971a); Verdcourt: 86 (1971b); Paiva: 181 (1983–84); Kessler: 120 (1993); Coates Palgrave: 205 (2002).

Oxymitra (Blume) Hook.f. & Thompson.

Species \pm 50–60, tropical Asia and Africa. According to Verdcourt (1971a)

the African species are probably not properly placed in this genus; *Friesodielsia obovata* (Benth.) Verdc. has been recorded in sthn trop. Afr. from Angola, Zambia, Zimbabwe, Malawi, Mozambique, and in sthn Afr.

Greenwayodendron Verdc.

Verdcourt: 89 (1969); Paiva: 179 (1983–84); Kessler: 113 (1993).

Polyalthia Blume sect. *Afropolyalthia* Engl. & Diels; Boutique: 339 (1951b).

Tall trees with simple hairs. **Flowers** unisexual or bisexual, solitary or in few-flowered fascicles, leaf-opposed. **Sepals** 3, slightly imbricate. **Petals** 6, in 2 whorls, outer ones valvate, inner ones imbricate, subequal. **Stamens** numerous in male flowers, few in female flowers; filaments linear to linear-oblong; anthers extrorse, connectives with an ovate, oblong, tongue-shaped, sometimes tooth-shaped apex. **Carpels** 10–20, free, 1–3-ovulate; style obsolete; stigma compressed-globose to rhomboid, obscurely lobed. **Monocarps** 2–18, indehiscent, globose, distinctly stipitate.

Species 2, trop. Africa; sthn trop. Afr. 1: *Greenwayodendron suaveolens* (Engl. & Diels) Verdc., Angola (Cabinda).

Hexalobus A.DC.

Exell & Mendonça: 16, 354 (1937/1951); Robson: 116 (1960); White: 52 (1962); Paiva: 61 (1966); Le Thomas: 81 (1969); Verdcourt: 44 (1971b); Kessler: 113 (1993); Coates Palgrave: 207 (2002); Izidine & Bandeira: 49 (2002) as *Hexabolus*; Lebrun & Stork: 32 (2003).

Species 5, trop. Africa; sthn trop. Afr. 3, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr. Its gamopetalous corolla, with lobes plicate in bud, provides a good “spot” character.

Isolona Engl.

Engler: 161 (1897); Exell & Mendonça: 31 (1937/1951); Paiva: 116 (1966); Le Thomas: 349 (1969); Verdcourt: 124 (1971b); Paiva: 185 (1983–84); Kessler: 128 (1993).

Trees or shrubs, glabrous or with simple hairs. **Flowers** bisexual, solitary, or paired, axillary, extra-axillary or cauliflorous; buds ovoid-subglobose; bracteoles 3 or 4, small; receptacle convex. **Sepals** 3, valvate, small. **Petals** 6, equal, valvate, in 1 whorl, fused at base into a tube. **Stamens** many, in 3 or 4 whorls; filaments short or absent; connective with a truncate, dilated apex. **Carpels** united into a 1-locular ovary; ovules many; placentation parietal. **Fruit** a globose to ellipsoid, stipitate syncarp with a dry to woody pericarp. $x = 8$.

Species ± 22, trop. Africa and Madagascar; sthn trop. Afr. 2: Angola.

Letestudoxa Pellegr.

Pellegrin: 654 (1920); Le Thomas: 96 (1969); Paiva: 179 (1983–84); Kessler: 127 (1993).

Pachypodanthium Engl. & Diels, in part; Exell & Mendonça: 15 (1937/1951).

Climbers with simple or fascicled hairs. **Flowers** bisexual, solitary, extra-axillary or ± leaf-opposed; buds globular to ovoid; receptacle convex. **Sepals** united into a calyptra, falling off by a circular slit. **Petals** 6, imbricate, in 2 whorls, free,

± equal. **Stamens** very many, sessile; connective with a truncate dilated apex. **Carpels** many; ovary ± cylindrical, with base included in receptacle; ovule 1, basal. **Fruit** a globose syncarp with mericarps joined in their lower quarter.

Species 2, W Africa; sthn trop. Afr. 1: *Letestudoxa bella* Pellegrin, Angola (Cabinda).

Mischogyne Exell

Exell: 213 (1932); Exell & Mendonça: 30, 356 (1937/1951); Paiva: 104 (1966); Le Thomas: 284 (1969); Kessler: 123 (1993).

Shrubs with simple hairs. **Flowers** bisexual, in axillary or extra-axillary fascicles; buds ovoid to ellipsoid; receptacle long-cylindrical. **Sepals** 3, valvate, shortly connate at base. **Petals** 6, valvate, in 2 whorls, subequal. **Stamens** many; connective without a prolonged apex. **Carpels** 4–40, free, cylindrical, stigmas bilobed; ovules many, 2-seriate.

Species 2; sthn trop. Afr. 1: *Mischogyne michelioides* Exell, Gabon; Angola.

Monanthotaxis Bail.

Exell & Mendonça: 22 (1937/1951); Paiva: 56 (1966); Verdcourt: 20 (1971a); Paiva: 179 (1983–84); Kessler: 123 (1993); White *et al.*: 128 (2001); Coates Palgrave: 206 (2002); Mapaura & Timberlake: 161 (2002); Lebrun & Stork: 36 (2003).

Enneastemon Exell: 209, t. 1 (1932); Exell & Mendonça: 26 (1937/1951); Robson: 128 (1960); White: 52 (1962); Paiva: 58 (1966), conserved name. *Popowia* in sense of many authors, not of Endlicher (1839); Exell & Mendonça: 23 (1937/1951); Robson: 122 (1960); White: 52 (1962); Paiva: 34 (1966).

Sthn trop. Afr. 11, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Monodora Dunal

Exell & Mendonça: 31, 356 (1937/1951); Robson: 145 (1960); Paiva: 119 (1966); Kessler: 128 (1993); Coates Palgrave: 211 (2002).

Sthn trop. Afr. 6, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Neostenanthera Exell

Exell: 5 (1935); Exell: 26 (1937/1951); Paiva: 86 (1966); Le Thomas: 189 (1969); Paiva: 183 (1983–84); Kessler: 118 (1993); Martins: 58 (1994).

Erect trees with simple hairs. **Flowers** bisexual, solitary or in fascicles, extra-axillary or leaf-opposed; bracteole minute. **Sepals** 3, valvate. **Petals** 6, valvate, in 2 whorls, outer ones longer than inner ones, inner concave at base, spoon-shaped. **Stamens** many, connective with triangular apex; anther cells transversely septate. **Carpels** many, free, cylindrical, with 1 basal ovule. **Monocarps** fusiform, stipitate. $x = 8$.

Species 5, tropical America and Africa; sthn trop. Afr. 1: *Neostenanthera gabonensis* (Engl. & Diels) Exell (= *N. micrantha* Exell), Angola (Cabinda).

Piptostigma Oliv.

Oliver: 158 (1865); Exell & Mendonça: 16 (1937/1951); Paiva: 100 (1966); Le Thomas: 111 (1969); Kessler: 115 (1993).

Brieya De Wild.; Exell: 11 (1926); Boutique: 304 (1951b).

Trees or small trees with simple hairs. **Flowers** bisexual, solitary, in few-flowered fascicles or in panicles, sometimes cauliflorous; buds conical or subglobose. **Sepals** 3, valvate, free. **Petals** 6, in 2 whorls, valvate, outer ones much shorter than inner ones and \pm equal to sepals, inner ones concave at base. **Stamens** many, connectives with truncate, dilated apex; filaments very short to absent. **Carpels** 2–8, free, cylindrical or \pm prismatic, with 4–20 ovules in 2 series. **Fruit** of monocarps free or \pm united at base, cylindrical-ellipsoid, fleshy, indehiscent. **Seeds** \pm horizontal, ellipsoid.

Species 14, trop. Africa; sthn trop. Afr. 3, Angola.

Polyalthia Blume

Blume: 68 (1830); Exell & Mendonça: 22 (1937/1951); Paiva: 32 (1966); Le Thomas: 199 (1969); Paiva: 369 (1970); Vollesen: 403 (1980); Kessler: 114 (1993); Bingham (Unpublished).

Trees, shrubs or undershrubs, sometimes polygamous. **Leaves** glabrous or with simple hairs. **Flowers** bisexual, or sometimes unisexual, solitary or in 2–several-flowered axillary or extra-axillary fascicles, leaf-opposed or supra-axillary; bracts and bracteoles present. **Sepals** 3, free or united at base, valvate or very slightly imbricate, much shorter than petals. **Petals** 6, free, valvate, in 2 equal or \pm unequal whorls. **Stamens** usually many, free or united at base, cuneate, with flat-topped or slightly convex connectives. **Carpels** many, free; ovules 1 basal or 2(–5) lateral; style nearly always absent; stigma subcapitate, globose or irregularly shaped. **Monocarps** few to many, globose to ovoid, indehiscent, mostly stipitate. **Seeds** horizontal.

Species 100, Old World tropics; sthn trop. Afr. 2, Angola (Cabinda), Zambia (exotic), Mozambique.

Polyceratocarpus Engl. & Diels

Engler & Diels: 56 (1900); Paiva: 48 (1966); Le Thomas: 269 (1969); Kessler: 116 (1993).

Trees or shrubs with simple hairs. **Flowers** bisexual or male, solitary or paired, axillary or extra-axillary, sometimes cauliflorous; buds subglobose; bracteoles present; receptacle subglobose or shortly cylindrical. **Sepals** 3, united at base, valvate, much smaller than petals. **Petals** 6, free, in 2 valvate whorls, subequal or outer ones slightly longer than inner ones. **Stamens** many, linear to cuneiform, subsessile; connective with a capitate or truncate, dilated apex. **Carpels** 4–20, free, oblong-cylindrical; ovules \pm 20, in 2 series. **Monocarps** cylindrical, sessile or subsessile, slightly constricted between seeds.

Species \pm 7, tropical W Africa; sthn trop. Afr. 3: Angola (Cabinda).

Sphaerocoryne (Boerl.) Scheff. ex Ridl.

Ridley: 8 (1917); Verdcourt: 293 (1986); Coates Palgrave: 205 (2002); Lebrun & Stork: 48 (2003).

Melodorum in sense of Verdcourt: 83 (1971b); Paiva: 181 (1983–84); Kessler: 119 (1993).

Shrubs, small trees or climbing shrubs; branchlets black, glabrescent or with sparse simple hairs, rarely densely velvety but soon glabrous. **Leaves**: bases of petioles \pm prominent; blades oblong-ovate or obovate, acuminate at apex,

cuneate at base, dark green and sometimes glossy above. **Flowers** bisexual, solitary or paired, terminal or axillary, stalked; bracteole small. **Sepals** 3, free or \pm connate, persistent in fruit. **Petals** 6, in 2 whorls, valvate or inner ones somewhat imbricate and slightly shorter than outer ones, remaining closed for long period. **Stamens** many; filaments not developed; connectives with obliquely capitate apex. **Carpels** 18–30, cylindrical or oblong; ovules 1(2), near base. **Monocarps** \pm 2–20, stipitate.

Sphaerocoryne gracile (Engl. & Diels) Verdc. from tropical East Africa and Angola, Zambia and Mozambique probably belongs to a new genus [Verdcourt: 293 (1986); Kessler: 120 (1993)].

Toussaintia Boutique

Boutique: 97 (1951a); Boutique: 278 (1951b); Le Thomas: 29 (1969); Kessler: 113 (1993); Lebrun & Stork: [48](2003).

Climbers with simple hairs. **Leaves** shortly petiolate, elliptic-oblong, with dense, fine reticulum. **Flowers** bisexual, solitary or in 2-flowered cymes, axillary or supra-axillary. **Sepals** 3, valvate. **Petals** 6–10, imbricate, in 2(3) whorls, subequal. **Torus** developed into an androgynophore. **Stamens** very many; filaments short; thecae linear, extrorse; connectives with a dilated, truncate apex; pollen in tetrads. **Carpels** many; ovules 14–20, in 2 rows; ripe carpels unknown.

Species 3, trop. Africa; sthn trop. Afr. 1: *Toussaintia congolensis* Boutique, Angola (Cabinda).

Uvaria L.

Exell & Mendonça: 11, 354 (1937/1951); Robson: 106 (1960); White: 53 (1962); Paiva: 10 (1966); Kessler: 111 (1993); Johnson *et al.*: 58 (1999); White *et al.*: 130 (2001); Bingham & Smith: 140 (2002); Coates Palgrave: 203 (2002); Mapaura & Timberlake: 171 (2002); Lebrun & Stork: 48 (2003).

Sthn trop. Afr. \pm 20, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

Uvariastrum Engl.

Engler: 531 (1901); Robson: 112 (1960); White: 53 (1962); Paiva: 54 (1966); Le Thomas: 288 (1969); Kessler: 115 (1993).

Small trees, much branched, evergreen, glabrous or with simple hairs; bark flaking; branches pliant, pendulous. **Leaves** petiolate, elliptic to oblong or oblanceolate. **Flowers** bisexual (rarely unisexual), solitary or paired, axillary, sometimes on old wood; buds conic; bracteole 1, usually caducous. **Sepals** 3, valvate, free, enclosing petals and with margins folded to form 3 \pm prominent longitudinal wings in bud, often densely brown-pubescent. **Petals** 6, in 2 whorls; inner whorl imbricate, expanding and spreading at anthesis, free, subequal; outer whorl usually slightly longer. **Stamens** many, linear, with thecae extrorse, and prolongations of connective \pm capitate. **Carpels** 3–10 or sometimes more numerous, free, cylindrical or obconic, sometimes \pm angular, with many ovules in two rows; style very short or absent; stigma \pm expanded, bilobed or irregular; ripe carpels indehiscent, succulent (? or sometimes dry), ellipsoid to cylindrical, shortly stipitate, many- to few-seeded. **Seeds** \pm horizontal; aril absent.

Species 8, trop. Africa; sthn trop. Afr. 1: *Uvariastrum hexaloboides* (R.E.Fr.)

R.E.Fr., Zambia. Can be distinguished from *Uvaria* by the axillary flowers and usually also by the valvate corolla and simple indumentum.

Uvari dendron (Engl. & Diels) R.E.Fr.

Fries: 51 (1930); Exell & Mendonça: 13 (1937/1951); Robson: 114 (1960); Paiva: 52 (1966); Le Thomas: 275 (1969); Paiva: 181 (1983–84); Kessler: 115 (1993); Izidine & Bandeira: 56 (2002).

Uvaria sect. *Uvari dendron* Engl. & Diels

Shrubs or trees, not climbing, with simple hairs. **Flowers** bisexual, solitary or paired, axillary, sometimes on old wood; buds depressed-globose; bracteoles 2–6, usually biseri ate, forming an involucre in sessile flowers. **Sepals** 3, valvate, free or united at base, not enclosing petals in bud, with plane margins, densely brown- or golden-sericeous outside, glabrous within. **Petals** 6 in 2 whorls, outer valvate, inner valvate above and open below, expanding and spreading at anthesis or inner whorl remaining connivent at apex, free, subequal, thick. **Stamens** very many, linear, with thecae lateral or extrorse and prolongations of connective capitate. **Carpels** many, cylindrical, with many ovules in 2 rows; style very short; stigma truncate, horseshoe-shaped; ripe carpels indehiscent, ovoid or ellipsoid to cylindrical, straight, subsessile, many-seeded. **Seeds** ± horizontal; aril absent.

Species ± 12, trop. Africa; sthn trop. Afr. 1: *Uvari dendron molundense* (Engl. & Diels) R.E.Fr., Angola (Cabinda). An unnamed species is also recorded from Mozambique by Robson (1960). The genus differs from *Uvariastrum* in the shape of the buds and in the sepals, which do not enclose the petals in bud. It is closely related to *Polyceratocarpus* Engl. & Diels in which the inner petals are wholly contiguous and the fruits are usually curved.

Uvariopsis Engl.

Engler: 298 (1899); Exell & Mendonça: 356 (1937/1951); Robson: 119 (1960); White: 54 (1962); Paiva: 94 (1966); Le Thomas: 296 (1969); Kessler: 123 (1993); Gereau & Kenfack: 39 (2000).

Tetrastemma Diels ex H. Winkl.

Shrubs or trees, not climbing, with simple hairs; monoecious or dioecious. **Flowers** solitary or in fascicles, axillary, sometimes on old wood, pedicellate; female larger than male; bracteoles 2, respectively basal and median, ± persistent. **Sepals** 2, connate to form a bilobed or patelliform calyx, much shorter than petals in bud. **Petals** 4, in one whorl, valvate, expanding and spreading at anthesis, free or ± connate, subequal, thick. **Stamens** very many, oblong to oblong-obovoid, with thecae extrorse; prolongation of connective absent or very short; filaments absent or very short. **Carpels** many, free, obovoid, pubescent, with many biseri ate ovules; stigma sessile, cylindrical or depressed-obconic; ripe carpels indehiscent, succulent, cylindrical or ellipsoid to obovoid, frequently constricted, stipitate, several-seeded. **Seeds** horizontal; aril absent.

Species 14, trop. Africa; sthn trop. Afr. 2, Angola, Zambia.

Xylo pia L.

Exell & Mendonça: 16, 355 (1937/1951); Robson: 133 (1960); White: 54 (1962); Paiva: 66 (1966); Paiva: 182 (1983–84); Kessler: 117 (1993); Coates Palgrave: 207 (2002); Izidine & Bandeira: 49 (2002); Mapaura & Timberlake:

171 (2002).

Sthn trop. Afr. ± 15, Angola, Zambia, Zimbabwe, Malawi, Mozambique, and sthn Afr.

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