

TENTATIVE KEYS TO THE SUBFAMILIES, TRIBES AND GENERA OF ZINGIBERACEAE

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The following keys represent, to a considerable extent, our working notes. Only in part are they based on extensive personal studies; for the rest they derive from those of K. Schumann, Valetton, Loesener and Holttum. The excuse for publication is that exposure to use will bring their weaknesses to light. We therefore hope that those who have the opportunity will try to use them, and that they will point out to us, preferably with accompanying specimens, where they break down or are difficult. At certain places (e.g. in dealing with *Boesenbergia*, *Haplochorema* and *Kaempferia*) they clearly cannot be satisfactory as we do not yet understand the limits of these genera. We have attempted to key out some of the better-defined groups in *Alpinia*, but with our present knowledge it is pointless to attempt a more detailed treatment of, for instance, the sections of subgen. *Dieramalpinia*.

KEY TO THE SUBFAMILIES AND TRIBES

- 1a. Leaves spirally arranged, sheaths tubular closed; lateral staminodes and epigynous glands absent; aromatic oil cells absent Subfam. *Costoideae*
- 1b. Leaves distichous, sheaths open on side opposite lamina; lateral staminodes usually petaloid or represented by teeth at the base of the lip, occasionally absent; epigynous glands rarely absent; aromatic oil cells present Subfam. *Zingiberoideae* 2
- 2a. Ovary with parietal placentae as seen in median transverse section; anther usually long-exserted on an arched ascending filament tribe *Globbeae*
- 2b. Ovary trilocular with axile placentae or unilocular with basal or free columnar placenta (occasionally with parietal placentae in *Riedelia* but then anther not exserted) 3
- 3a. Style exserted well beyond the fertile part of the anther; the elongate anther-crest wrapped around the style; stigma not expanded; plane of distichy of leaves parallel to rhizome tribe *Zingibereae*
(only one genus: *Zingiber*)
- 3b. Style not far exserted beyond anther; anther-crest, if present, not wrapped round style; stigma expanded; plane of distichy of leaves parallel or transverse to rhizome 4
- 4a. Distichy of leaves parallel to rhizome; lateral staminodes petaloid, free from labellum (rarely connate to it and then pseudostem very short and leaf sheaths loosely clasping—*Kaempferia* subgen. *Cienkowskia*) tribe *Hedychieae*

- 4b. Distichy of leaves transverse to rhizome; lateral staminodes represented by small teeth at base of labellum or absent, rarely forming distinct linear processes or petaloid appendages adnate to the lower part of the labellum and then leaf frond (pseudostem) well developed tribe *Alpineae*

KEY TO THE GENERA OF ZINGIBEROIDEAE—GLOBBEAE

- 1a. Filament short, not exceeding the petals *Hemiorchis*
 1b. Filament long exserted 2
 2a. Labellum 3-lobed, central lobe very small *Gagnepainia*
 2b. Labellum 2-lobed or entire 3
 3a. Lateral staminodes elliptic, resembling and arising at the same level as the petals *Globba*
 3b. "Lateral staminodes" linear or spatulate processes arising on either side of the filament *Mantisia*

KEY TO THE GENERA OF ZINGIBEROIDEAE—HEDYCHIEAE

- 1a. Primary bracts adnate to each other laterally for about half their length, forming basal pouches *Curcuma*
 1b. Primary bracts not adnate laterally 2
 2a. Inflorescence surrounded by a bell-shaped involucre (primary bract?) *Stahlianthus*
 2b. Inflorescence not surrounded by a bell-shaped involucre 3
 3a. Primary bracts large, concave, margins adnate to the main axis at the base, thus appearing tubular in lower third 4
 3b. Primary bracts boat-shaped, free to the base 5
 4a. Anther spurred, truly versatile; primary bracts rarely more than one per inflorescence, usually lacking an apical lamina-like appendage *Camptandra*
 4b. Anther never versatile; primary bracts 1-3 per inflorescence, always with an apical lamina-like appendage
 Caulokaempferia sect. *Pyrgophyllum*
 5a. Inflorescence borne separately from, and often appearing before, the leaves 6
 5b. Inflorescence terminal on a tall or short leafy stem, central to developed or underdeveloped leaf tuft or from the sheath of the single leaf 8
 6a. Bracteoles absent, anther-crest c. 1 mm *Hannifia*
 6b. Bracteoles present, anther-crest over 2 mm 7
 7a. Lateral staminodes more or less free from labellum (Asia)
 Kaempferia subgen. *Protanthium*
 7b. Lateral staminodes connate to the labellum, the united basal part enfolding the filament (Africa and Madagascar)
 Kaempferia subgen. *Cienkowskia*
 8a. Anther versatile with two long basal spurs held at right angles to the thecae 9
 8b. Anther sometimes free in lower quarter or third, never truly versatile, occasionally with short basal appendages, never spurred 10

- 9a. Dorsal petal very broad, more or less cucullate; capsule tardily dehiscent, flowers purple or white, rarely yellow . . . *Roscoeia*
- 9b. Dorsal petal narrow, capsule splitting readily to the base; flowers yellow . . . *Cautleya*
- 10a. Primary bracts minute, bracteoles 0; each anther theca with an apical linear-acuminate crest . . . *Silicquamomum*
- 10b. Primary bracts always clearly visible; bracteoles usually present; anther-crest when present, never as above . . . 11
- 11a. Bracteoles tubular; labellum always bilobed, anther crest 0 . . . 12
- 11b. Bracteoles, if present, open to the base, labellum entire or bilobed; anther-crest usually developed . . . 14
- 12a. Inflorescence few-flowered, labellum under 5 mm long, strongly reflexed . . . *Brachychilum*
- 12b. Inflorescence many-flowered; labellum 1 cm long or more, not reflexed . . . 13
- 13a. Corolla tube long exserted from bracts; primary bracts imbricating or not; labellum large and conspicuous . . . *Hedychium*
- 13b. Corolla tube not long exserted from the bracts; primary bracts closely imbricating (inflorescence *Curcuma*-like but bracts free from each other) . . . *Hitchenia*
- 14a. Stem well developed (up to c. 60 cm) . . . 15
- 14b. Stem poorly developed (probably never exceeding 10 cm) . . . 16
- 15a. Anther-crest conspicuous, petaloid, often reflexed; labellum not strongly concave . . . *Caulokaempferia* sect. *Caulokaempferia*
- 15b. Anther-crest not produced; labellum strongly concave . . . *Boesenbergia*
- 16a. Flowers one to each primary bract . . . 17
- 16b. Flowers more than one to each primary bract . . . *Scaphochlamys*
- 17a. Primary bracts arranged distichously, the uppermost flower opening first . . . 18
- 17b. Primary bracts arranged spirally, the lowermost flower opening first . . . 19
- 18a. Labellum held flat in mature flower; anther-crest petaloid, reflexed . . . *Haplochorema*
- 18b. Labellum concave; anther-crest not reflexed nor petaloid . . . *Boesenbergia*
- 19a. Rhizome thick, short and fleshy; bracteoles narrow, usually bi-lobed; shorter than the primary bracts . . . *Kaempferia* subgen. *Kaempferia*
- 19b. Rhizome thin, creeping; bracteoles entire, longer than the primary bracts . . . *Scaphochlamys*

KEY TO THE GENERA OF ZINGIBEROIDEAE—ALPINIEAE

- 1a. Inflorescence borne separately from the leaves . . . 2
- 1b. Inflorescence terminal on a leafy stem or from the centre of a tuft of leaves (some *Riedelia* spp.) . . . 19
- 2a. Primary bracts absent; calyx deciduous . . . *Riedelia* Sect. *Geocharides*
- 2b. Primary bracts present; calyx persistent . . . 3
- 3a. Inflorescence forming a compact head; main axis usually hidden by imbricating sterile or primary bracts . . . 4

- 3b. Inflorescence lax, main axis visible; sterile bracts never present, primary bracts not imbricating 11
- 4a. Fruit flask-shaped, fleshy; anther-crest conspicuously 3-lobed (Africa & Madagascar) *Aframomum*
- 4b. Fruit a more or less spherical dry or fleshy capsule; anther-crest variously formed 5
- 5a. Base of labellum and filament forming a distinct tube above the petals; anther more or less emarginate, rarely crested 6
- 5b. Base of labellum and filament not so joined; anther usually crested, rarely emarginate 8
- 6a. Peduncle up to 1 m tall, usually erect, always held above ground; inflorescence with a showy involucre of sterile bracts
Nicolaia
- 6b. Peduncle very short, subterranean, sterile bracts few to many rarely 0 7
- 7a. Labellum with a conspicuously elongated central portion, inrolling spirally after flowering *Achasma*
- 7b. Labellum not conspicuously elongated *Geanthus*
- 8a. Leaf shoot an elongated many leaved frond 9
- 8b. Leaf shoot short stemmed, leaves 1-5, longer than the stem 10
- 9a. Inflorescence clothed with rigid, sterile bracts; corolla tube more than twice the length of the labellum *Hornstedtia*
- 9b. Inflorescence overlapped by upper scales of peduncle, no sterile bracts, primary bracts not rigid; corolla tube shorter than or equal to the labellum in length *Amomum*
- 10a. Anther-crest petaloid; only the second flower of the 2-flowered cincinnus bracteolate *Elettariopsis*
- 10b. Anther-crest not petaloid; bracteoles 0 "*Alpinia pumila*"
- 11a. Inflorescence prostrate, much elongated; sometimes more or less subterranean and only the upper part of the flowers above ground 12
- 11b. Inflorescence erect or decurved 14
- 12a. Flowers in several-flowered cinnini; anther-crest small and inconspicuous *Elettaria*
- 12b. Flowers borne singly on the main axis; anther-crest conspicuous 13
- 13a. Anther-crest almost equalling the labellum in size; bracteoles tubular (Ceylon) *Cyphostigma*
- 13b. Anther-crest much smaller than the labellum, bracteoles open to the base *Elettariopsis*
- 14a. Labellum deeply divided into two narrow lobes; filament with lateral subapical appendages *Geocharis*
- 14b. Labellum not so divided; filament unappendaged 15
- 15a. Base of lip and filament forming a distinct tube above the petals; anther-crest conspicuous, petaloid (Madagascar) *Aulotandra*
- 15b. Base of lip and filament not so joined; anther-crest, when present not petaloid 16
- 16a. Bracteoles tubular 17
- 16b. Bracteoles open to the base or 0 18

- 17a. Labellum held erect; leaf lamina with stellate hairs (Africa & America) *Renealmia*
- 17b. Labellum horizontal or pendulous; leaf lamina lacking stellate hairs (Asia) *Geostachys*
- 18a. Bracteoles open to base "*Alpinia chrysogynia*"
- 18b. Bracteoles o "*Alpinia melichroa*"
- 19a. Leaves cordate or subsagittate; labellum connate intramarginally to the base of the long *Globba*-like filament . . . *Pommereschea*
- 19b. Leaves never cordate or subsagittate; labellum not intramarginally connate to the rarely long exerted filament . . . 20
- 20a. Petals strap shaped (*Hedychium*-like); labellum held erect round the long exerted filament (Burma) gen. nov. ?
- 20b. Petals never strap-shaped; labellum if held erect then not in association with a long exerted filament 21
- 21a. Bracteoles tubular, usually persistent 22
- 21b. Bracteoles open to the base or o 26
- 22a. Inflorescence breaking through the uppermost leaf sheath laterally (actually terminal on the leafy stem); at least the upper part of the bracteole early decaying *Plagiostachys*
- 22b. Inflorescence not breaking through the leaf sheath laterally; bracteoles not early decaying 23
- 23a. Labellum inconspicuous, either narrowly lanceolate and not exceeding the calyx or reduced to a minute tooth 24
- 23b. Labellum conspicuous always exceeding the calyx 25
- 24a. Labellum narrowly lanceolate, not exceeding the calyx; filament narrow, flat *Nanochilus*
- 24b. Labellum reduced to a minute tooth; filament boat-shaped, narrowed at the apex *Rhynchanthus*
- 25a. Labellum held erect, not strap-shaped; leaf lamina with stellate hairs (Africa & America) *Renealmia*
- 25b. Labellum horizontal or pendulous, if erect then strap-shaped; leaf lamina without stellate hairs *Alpinia* subgen. *Dieramalpinia*
- 26a. Calyx short, campanulate, remaining entire on the capsule; filament broad, boat-shaped, often with subapical teeth *Alpinia* sect. *Psychanthus*
- 26b. Calyx sheath-like, persistent in lower part or falling with the flower; filament without subapical teeth 27
- 27a. Labellum strongly cup-shaped, margins connate in the lower part to the base of the filament *Alpinia* sect. *Pleuranthodium*
- 27b. Labellum never cup-shaped, if connate to the filament then at the base only 28
- 28a. Cincinni many-flowered; both primary bracts and bracteoles present; inflorescence often branched at the base *Alpinia* sect. *Alpinia*
- 28b. Cincinni 1-3-flowered; primary bracts and bracteoles not normally both present; inflorescence rarely branched 29
- 29a. Bracts or bracteoles present 30
- 29b. Bracts and bracteoles o 32
- 30a. Flowers in cincinni of (1-) 2-3; bracteoles usually conspicuous, enfolding the flower buds, early deciduous *Alpinia* subgen. *Catimbium* et *Probolocalyx* p.p.

- 30b. Flowers borne singly on the main axis; primary bracts present 31
 31a. Primary bracts small, often breaking off, occasionally calyptrate; lateral petals free from lip *Cenolophon*
 31b. Primary bracts conspicuous; lateral petals connate to each other and to the entire basal part of the labellum (Philippines) *Vanoverbergia*
 32a. Lip entire, pendulous (Philippines) *Leptosolena*
 32b. Lip bilobed, sometimes to the base, held erect (Borneo and New Guinea) 33
 33a. Calyx deciduous, anther-crest absent or inconspicuous; capsule spherical to oblong (New Guinea) *Riedelia*
 33b. Calyx persistent, anther-crest elongated, capsule narrow much elongated *Burbidgea*

KEY TO THE GENERA OF COSTOIDEAE

- 1a. Lip large, showy; filament petaloid 2
 1b. Lip small; filament not petaloid, narrow *Tapeinochilus*
 2a. Bracteoles open to base; ovary trilocular *Costus*
 2b. Bracteoles tubular; ovary bilocular 3
 3a. Flowers solitary, axillary; seed uniseriate *Monocostus*
 3b. Flowers spicate; seed pluriseriate *Dimerocostus*