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WHAT is known as Engler's System of the Classification of Plants embodied in the *Natürliche Pflanzenfamilien* and in the successive editions of the *Syllabus der Pflanzenfamilien*, in the opinion of many modern systematic botanists represents, as a whole, the nearest approach to a natural system that we possess.

While specialists may criticise it in one detail or another, and while it is certain that we are as yet far from finality, owing to the numerous lacunae which still exist in our knowledge of different groups, there can be little if any doubt that no other published system of classification rivals Professor Engler's in broad grasp of principle and masterly treatment of complicated detail. It is the conspicuous merit of Professor Engler and his collaborators that they have kept constantly presented to botanists in the successive editions of the *Syllabus* the best scheme that could in their judgment be devised at the moment.

The present work is intended to familiarise students of British Vascular Plants with Engler's system in its latest form and thus both to habituate British floristic students to the use of a more natural system than that
to which they have been accustomed in the British Floras that have hitherto appeared, and to serve as an introduction to the use of the *Syllabus*, the *Natürliche Pflanzenfamilien* and the *Pflanzenreich*.

The major divisions of the vascular plants with their diagnoses are taken, to a large extent, *verbatim* from the *Syllabus der Pflanzenfamilien* (7th Edition 1912).

Professor Engler and his publishers have most kindly and readily accorded their assent to this very free use of their publication.

In a few cases Engler's arrangement has been departed from.

Thus the nomenclature of the larger divisions of Pteridophyta has been somewhat modified in order to secure uniformity in the terminations of the names of Orders (Reihen). Prof. Bower's arrangement of the Leptosporangiate Ferns into Simplices Mixtae and Gradatae has been adopted as representing the most rational grouping, though the distinct suborder of Filicales, Hydropteridineae, has been retained owing to the difficulty of assigning with certainty the Marsiliaceae and Salviniaceae to their proper places in the Eufilianeian series.

The Family Polypodiaceae, practically equivalent to the Mixtae of Bower, has been retained and divided into tribes according to the arrangement of the *Syllabus*, since our knowledge of the Systematics of this intricate
group is not sufficiently advanced to admit of a grouping of the Mixtae into Natural Families. In dealing with the British Genera alone this arrangement does not appear to do much violence to natural affinities so far as they have been ascertained.

Among the Flowering Plants Warming's arrangement of the Urticales has been followed mainly because of the difficulty of defining the Family Moraceae so as to include Cannabis and Humulus (subfamily Cannaboideae of Engler).

In all the other Orders the arrangement of the Syllabus has been closely followed, though the actual diagnoses, especially in cases where an Order or Family is poorly represented in Britain, have been to some extent modified.

The Characters of the Genera have either been obtained from various sources, such as Hooker's Student's Flora and Garcke's Flora von Deutschland, or are original, and they will, it is hoped, prove useful to students.

The following books, besides the Syllabus and Pflanzenfamilien, have been constantly used by me during the compilation of this work.

Garcke. Flora von Deutschland. Edited by Dr Franz Niedenzu, 1908.
Preface

Hooker, Sir J. D. *The Student's Flora of the British Islands*, 1884.
Warming. *Frøplanterne*, 1912.
Willis, J. C. *Flowering Plants and Ferns*, 1908.

My best thanks are due to Mr Tansley for help and advice with the Pteridophytes, to Professor Seward for reading the proofs of the Pteridophytes and Gymnosperms, and to Dr Moss who has read the entire proofs and given me much valuable advice and assistance throughout.

H. G. C.

Cambridge,
August 1913.
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Order 7. Aristolochiales
Fam. Aristolochiaceae

Order 8. Polygonales
Fam. Polygonaceae

(c. (Consisting of the one order Centro spermae.) Corolla usually haplochlamydeous, sepaloid or petaloid. Heterochlamydy, however, is not uncommon.

Order 9. Centrospermae
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Order 11. Rhoeadales
Fam. 1. Papaveraceae
Fam. 2. Cruciferae
Fam. 3. Resedaceae
Order 12. *Sarraceniales*

Fam. *Droseraceae*

7. *Apocarpy* and *Hypogyny* still occur but *Perigyny* becomes more frequent. By sinking of the *Gynaecium* into the hollow flower-axis, *Syncarpy* and *Epigynous* insertion of the perianth and stamens also takes place.

Order 13. *Rosales*

Fam. 1. *Crassulaceae*
Fam. 2. *Saxifragaceae*
Fam. 3. *Platanaceae*
Fam. 4. *Rosaceae*
Fam. 5. *Leguminosae*

5. The flowers have predominantly 5 or 4 whorls. *Apocarpy* and *Isomery* still occur, but *Syncarpy* and *Oligomery* of the *Gynaecium* preponderate. *Pleiomery* of *Gynaecium* rare.

Order 14. *Geraniales*

Fam. 1. *Geraniaceae*
Fam. 2. *Oxalidaceae*
Fam. 3. *Linaceae*
Fam. 4. *Polygalaceae*
Fam. 5. *Euphorbiaceae*
Fam. 6. *Callitrichaceae*

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5. The flowers are cyclic and the sinking of the gynaeicum into the hollow flower-axis is general: connation of gynaeicum and flower-axis predominates .................................................. 71 274

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A. Polypetaly, as well as sympetaly, occurs. Two whorls or one
whorl of stamens. Hypogyny predominates, but epigyny also occurs.

Order 1. **Ericales**
- Fam. 1. **Pirolaceae**
- Fam. 2. **Ericaceae**

Order 2. **Primulales**
- Fam. **Primulaceae**

Order 3. **Plumbaginales**
- Fam. **Plumbaginaceae**


Order 4. **Contortae**
- Fam. 1. **Oleaceae**
- Fam. 2. **Gentianaceae**
- Fam. 3. **Apocynaceae**


a. Perianth hypogynous.

Order 5. **Tubiflorae**
- Fam. 1. **Convolvulaceae**
- Fam. 2. **Polemoniaceae**
- Fam. 3. **Borraginaceae**
- Fam. 4. **Verbenaceae**
- Fam. 5. **Labiatae**
- Fam. 6. **Solanaceae**
- Fam. 7. **Scrophulariaceae**
- Fam. 8. **Orobanchaceae**
- Fam. 9. **Lentibulariaceae**
Order 6. **Plantaginales**
   Fam. **Plantaginaceae**

   b. **Perianth epigynous**
      a. **Stamens free**

Order 7. **Rubiales**
   Fam. 1. **Rubiaceae**
   Fam. 2. **Caprifoliaceae**
   Fam. 3. **Adoxaceae**
   Fam. 4. **Valerianaceae**
   Fam. 5. **Dipsacaceae**

   b. **Stamens conniving or partly united**

Order 8. **Cucurbitales**
   Fam. **Cucurbitaceae**

Order 9. **Campanulatae**
   Fam. 1. **Campanulaceae**
   Fam. 2. **Compositae**
GLOSSARY OF WORDS RELATING TO PERIANTH

Achlamydeous. With no perianth (naked).
Apochlamydeous. Perianth absent by reduction.
Apopetalous. Corolla absent by reduction.
Haplochlamydeous. Having a perianth consisting of a single whorl.
Diplochlamydeous. Having a perianth consisting of two whorls.
Homochlamydeous. Diplochlamydeous with both whorls of the same kind.
Heterochlamydeous. Diplochlamydeous with whorls clearly unlike each other.

In Floral Formulae


*= not native,
© = doubtfully native,
Division 1. **EMBRYOPHYTA ASIPHONO-GAMA (ARCHEGONIATAE).**

Plants with marked alternation of generations. *Sexual generation* (gametophyte) bearing *antheridia*, in which *spermatozoids* arise, and *archegonia*, each containing an *egg-cell*. The fertilized egg-cell gives rise to an *embryo*, which for some time or throughout life remains attached to, and nutritively dependent on, the gametophyte. The embryo grows into the asexual generation (*sporophyte*), eventually producing *spores*, which again give rise to the gametophytes.

[Subdivision 1. Bryophyta (not included in this work). Gametophyte thalloid or leafy, free living. Sporophyte (sporogonium) leafless, attached throughout life to the gametophyte: no true roots.]

Subdivision 2. **PTERIDOPHYTA.** Gametophyte (*prothallus*) thalloid, usually vegetating independently, rarely completely enclosed in the spore. Sporophyte a cormophytic plant with true leaves and roots, early becoming independent of the gametophyte, and bearing *spores* in separate organs (*sporangia*) borne on or in connection with the leaves.

Class 1. **EQUISETARIAE.** Leaves generally small in relation to the stem, in alternating whorls. Stele with separate collateral bundles. Peltate *sporangiofores* aggregated in cones. Sporangia bulky, attached to the

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*(Note: The text appears to be cut off at the end, and the last part of the sentence is incomplete.)*
inner surface of the lamina of the sporangiophore. Homosporous or (in some extinct forms) heterosporous.

Order **Equisetales** (including all living forms). Homosporous.


Only genus: **Equisetum**.

**Class 2. LYCOPODIARIAE.** *Leaves* usually small in relation to stem. *Stem* with one or more haplosteles†. *Sporangia* single in axils, or on adaxial faces of fertile leaves. Homosporous or heterosporous. *Spermatozoids* biciliate.

Order 1. **Lycopodiales.** Small leaved herbs of erect or creeping habit. *Sporophylls* mostly aggregated in *cones*.

Suborder 1. **ELIGULATAE.** Homosporous forms without *ligule*.

Family **LYCOPODIACEAE.** Erect or suberect herbs with modified *haplostele*. *Prothalli* generally subterranean, saprophytic, with symbiotic fungus. *Embryo* often living a subterranean life for some years.

Only British genus: **Lycopodium**.

Suborder 2. **LIGULATAE.** Heterosporous forms with ligule.

Family *Selaginellaceae*. Erect or suberect herbs. Haplostelic or polystelic. *Rhizophores* often arising exogenously and bearing endogenous roots. *Leaves* rarely spiral, more often in two dorsal and two ventral rows. *Sporophylls* aggregated in *cones*, which contain both *macro- and microsporophylls*. *Macrosporangia* typically with four *macrospores*, *microsporangia* with numerous *microspores*. *Embryo* with two cotyledons.

Only genus: *Selaginella*.

(The British species is haplostelic with spirally arranged leaves.)

Order 2. **Isoëtales.** Submerged subaquatic or terrestrial plants with very short unbranched fleshy *stems*, bearing alternating whorls of sterile and fertile, elongated, subulate or filiform *leaves*. *Stele* with anomalous secondary thickening. *Sporangia* bulky, single, in pit on adaxial face of leaf base adjoining the *ligule*. *Macrosporangia* with numerous *macrospores*, *microsporangia* with very numerous *microspores*. Sterile *trabeculae* between the spores. *Spermatozoids* multiciliate.

Only family: **ISOËTACEAE**.

Only genus: *Isoëtes*.

Class 3. **FILICARIAE.** *Leaves* almost always large in relation to the *stem*, often highly compound, mostly with circinate *vernation*. *Stem* haplostelic, solenostelic†

† Solenostele. A stele in which the vascular tissue is arranged in a hollow cylinder of xylem lined within and without by phloem, pericycle and endodermis, and the continuity of which is interrupted by leaf-gaps which do not overlap (Tansley, *l.c.*).

I—2
or dictyostelic†, departure of leaf-traces in all but haplosteleic forms making definite leaf-gap in the stele. Sporangia on the undersides or on the edges of ordinary foliage leaves, or of modified leaves (sporophylls) with reduced laminae; in the latter case the sporophylls are not aggregated on special shoots, or special regions of the shoot. Spermatozoids multiciliate.

Order 1. Filicales. Sporangia mostly arising from single cells, more rarely from groups or from several layers of cells, usually in definite aggregates (sori). Prothallus not subterranean, generally flat.

Suborder 1. Filicineae. Wall of the sporangium typically with a prominent cell row or cell group (annulus) concerned with the dehiscence of the sporangium. Spores all alike producing comparatively large free-living monoclinous or diclinous prothalli.

Simplices (Bower). Sporangia grouped in sori each containing few sporangia of simultaneous origin on a flat or nearly flat receptacle or spread over the lower surface of the fertile leaf, relatively large, sessile or subsessile, with a large spore output. Annulus transverse or oblique or (as in the British genus) represented by a group of thickened cells. Indusium typically absent.

Family Osmundaceae. Stem upright covered with the bases of spirally arranged leaves. Stele with continuous mantle of peripheral phloem and anastomosing xylem strands surrounding a pith. Petiolar vascular

† Dictyosteole. A stele in which the hollow cylinder of the solenosteleic type is interrupted by leaf-gaps which overlap (Brebner, l.c.).
strand horseshoe-shaped in cross section. Sporangia massive, shortly stalked with vertical dehiscence, not arranged in sori, but thickly set on the surface of special, often reduced, fronds or pinnae.

Only British genus: Osmunda.

GRADATAE (Bower). Sporangia basipetal, on a more or less elongated receptacle, of moderate size, shortly stalked, with medium spore output. Annulus oblique. Indusium a basal cup, entire or 2-lipped.

Family HYPHENOPHYLLACEAE. Rhizomes creeping, haplostelic, bearing fronds with thin filmy laminae which have no stomata or intercellular spaces in the mesophyll. Sori marginal on the ends of excurrent veins.

Hymenophyllum.

MIXTAE (Bower). Sporangia of various ages mixed without regular orientation, grouped in sori, on flat or nearly flat receptacles, more rarely scattered over the leaf, typically small, with thin elongated stalks and with small spore output. Annulus vertical, incomplete, dehiscence transverse. Indusium various or absent.

Family POLYPODIACEAE. Rhizome of various habit, typically dictyostelic.


Indusium often ciliate, attached basally. Woodsia. Indusium hooded, attached laterally. Cystopteris.
Tribe 2. *Aspidieae*. Sori circular or subcircular in outline, flattish; *indusium* attached centrally, peltate.

Sorus cordate, *indusium* reniform, attached in the sinus or absent. *Dryopteris* (including *Phegopteris*). Sorus circular, *indusium* attached in the centre. **Polystichum**.

Tribe 3. *Asplenieae*. Sori elongated to linear, developed along veins from which the lateral *indusium* springs.

Subtribe 1. *Blechninae*. Sori on veins parallel to the midrib of pinna or pinnule of special fertile leaves.

Only British genus: **Blechnum**.

Subtribe 2. *Aspleninae*. Sori on lateral veins of pinna or pinnules of ordinary fronds.

*Indusium* with single flap entire. **Asplenium**.

*Indusium* with single flap, margin lacerate. **Athyrium**.

*Indusium* with two flaps, one on either side of sorus. **Scolopendrium**.

Tribe 4. *Pterideae*. Sori elongated to linear, developed along special veins. *Indusium* mostly absent, sometimes developed as an infolding of the leaf margin.

Subtribe 1. *Gymnogramminae*. Sori occupying the whole of the fertile veins.

Only British genus: **Gymnogramme**.

Subtribe 2. *Cheilanthesinae*. Sori occupying the distal ends of the fertile veins.

Only British genus: **Cryptogramme**.

Subtribe 3. *Adiantinae*. Sori occupying the distal ends of the fertile veins, within the revolute leaf margin.

Only genus: **Adiantum**.

Only British genus (sorus with an additional inner indusial ciliate flap): *Pteridium* (= *Pteris auct.*).


Only British genus (sori circular): *Polypodium*.


Only British genus (leaves filiform): *Pilularia*.

Family 2. *Salviniaceae*. *Rhizome of sporophyte* floating, haplostelic, with two or three rows of partly submerged leaves, on which the *sori*, enclosed in *indusia*, are borne. *Female prothallus* producing several archegonia.

Leaves in two rows, deeply bilobed. True roots present†.

*Azolla*.

Order 2. *Ophioglossales*. *Fertile leaves* with one or more simple or pinnate branches bearing the bulky,

† Cf. the exotic genus *Salvinia* which is rootless.
marginal sporangia which arise from groups of cells. *Prothallus* tuberous, subterranean with numerous sunken antheridia and archegonia.

Family **Ophioglossaceae**. *Stem* short, vertical, sunk in the earth and sending up a few leaves which take several years to develop.

Sterile leaf-segment pinnate. Pinnules with digitate nerves. Fertile segments branched. **Botrychium**.

Sterile leaf-segment simple, entire with reticulate veins. Fertile segment unbranched, spike-like. **Ophioglossum**.

Division 2. **EMBRYOPHYTA SIPHONOGAMA** *(Phanerogamae auct.)*.

*Alternation of generations* obscured by seed formation. *Sporophyte* cormophytic, very various, heterosporous.

The *megaspore* *(embryo sac)* is not discharged from the *sporangium* *(ovule)* which after fertilisation ripens to form a *seed*.

*Microspore* *(pollen grain)* on germination forming a tube. *Antheridium* represented by a single cell which divides to form two naked *generative cells* which in the lowest Gymnosperms become transformed into *Spermatozoids*.

Subdivision 1. **GYMNOSPERMAE**. *Microsporangia* on under surface of sporophylls. *Carpels* not fused together to form an ovary, thus no *stigma* is present.

The *microspores* *(pollen grains)* germinate at the *micropile*. *Seeds* naked on the ovuliferous scales or on a direct prolongation of the axis.

*Prothallus* *(endosperm)* formed before fertilisation.
Class I. **CONIFERAE.** Stem much branched. No *vessels* in secondary wood. *Leaves* mostly narrow, linear or lanceolate. *Flowers* **diclinous.** *Perianth o or bracteoid.** *Cotyledons* 2–15, free.

**Fam. 1. TAXACEAE.** *Carpels* solitary or few. *Seed* drupaceous exserted.

Subfamily *Taxoideae.* *Stamens* with 3–8 *pollen sacs.* *Carpels* with two ovules or the ♀ *flower* reduced to a single *ovule.*

**Tribe Taxeae.** ♀ *flower* reduced to a solitary terminal *ovule.*

Only British genus (*Mesophyll with no resin canals*): **Taxus.**

**Fam. 2. PINACEAE.** *Resin canals* always present in leaves. *Micro- and megasporophylls* numerous, arranged in cone-like *flowers.* *Seeds* not exserted.

**Tribe 1. Abietineae.** *Leaves* spiral. *Carpels* divided into *cover-scales* and *ovuliferous scales,* the latter with two ovules side by side on the upper surface.

1. Only long shoots present with spiral evergreen leaves.

Bark greyish white. *Leaves* flat, emarginate with two white lines beneath. *Cones* erect, scales deciduous. ***Abies.***

Bark reddish. *Leaves* 4-angled in section, acute. *Cones* pendulous, scales persistent. ***Picea.***

As *Picea* but leaves flat. ***Tsuga* (including *Pseudo-tsuga* with long 3-fid cover-scales).**
2. Long and short shoots present.
   Long and short shoots both with deciduous leaves. Cone-scales broad, coriaceous, persistent.  *Larix.*
   Long and short shoots both with evergreen leaves. Cone-scales deciduous.  *Cedrus.*

   Cone-scales fleshy and confluent in fruit. Only British genus:  *Juniperus.*

Subdivision 2. *ANGIOSPERMAE.* *Ovules* enclosed in an *ovary* formed of coherent *carpels* or of one carpel with coherent margins. *Stigma* present to receive pollen.


A. Orders with preponderating inconstancy in the number of floral leaves.  (For B see page 23.)
   a. Typical aehlamydeous (not apopetalous) flowers still occur.  (For b see page 21.)
      a. Aehlamydeous flowers predominate. Great inconstancy in number of stamens and also of carpels.  (For β see page 11.)

Order 1. *Pandanales.* Marsh herbs (or tropical trees and lianes). *Leaves* linear. *Inflorescence* cylindrical or spherical. *Flowers* naked or with haplochlamydeous, bracteoid perianth, diclinous, ♀ with $\infty-1$ *stamens*, ♂ with $\infty-1$ *carpels*. *Seed* with endosperm.
Typhaceae, Sparganiaceae 11

Fam. 1. Typhaceae. Herbs with rhizomes and distichous, linear leaves. Inflorescence cylindrical, ♀ flowers below, ♂ above. ♂ flowers of 2–5 stamens often united; pollen in tetrads. ♀ flowers of one carpel on an elongated axis which bears hairs. Stigma narrow. Ovule one, pendulous. Fruit an achene. Seed with thin perisperm and fleshy endosperm.

Only genus: Typha.


Only genus: Sparganium.

β. Naked flowers still present: but in this order there occur all possible gradations from Achlamydy to Heterochlamydy, also from Hypogyny to Epigyny. Sporophylls definite or indefinite. (For a see page 10, for γ see page 15.)

Order 2. Alismatales (Fluviales, Helobiae). Herbaceous water or marsh plants with scales (Squamulae intravaginales) in the leaf axils. Flowers cyclic or hemicyclic; achlamydeous, haplochlamydeous or diplochlamydeous (homochlamydeous or heterochlamydeous); hypogynous, or epigynous. Stamens ∞–1. Carpels ∞–1, usually apocarpous when superior. Endosperm absent or scanty.

Suborder 1. Potamogetonineae. Flowers hypogynous, achlamydeous or haplo- to homochlamydeous.

Fam. 1. Potamogetonaceae. Submerged or floating fresh or salt water plants. Leaves mostly distichous. Flowers mostly small, solitary or in spikes, dicipinous or monoclinous with 4–1-merous whorls.
**Potamogetonaceae, Naiadaceae**

Perianth mostly absent. Stamens 4–1. Carpels 4–1, each with one pendulous ovule. Fruit often drupaceous.

a. Flowers in spikes.


Only British genus: **Zostera**.


Spike usually many-flowered. Tepals 4: stamens 4: achenes sessile. **Potamogeton**.

Spike 1–2-flowered. Tepals 0: stamens 2: achenes stipitate. **Ruppia**.


Only British genus: **Zannichellia**.

Fam. 2. NAIADACEAE. Slender, submerged fresh or brackish water herbs. Stem with central cylinder of elongated cells enclosing a canal. Leaves opposite, linear, toothed, almost imbricating. Flowers diclinous. ♀ of two cup-like envelopes and a terminal anther. ♂ of one cup-like envelope (which may be absent) and one carpel containing one basal anatropous ovule.

Only genus: **Naias**.


Only genus: **Aponogeton**.

Tribe. Triglochineae. All flowers of inflorescence similar.


a. Flower-axis flat. Stamens 6 in one whorl. Carpels also more or less cyclic.

b. Carpels with one ovule.
Leaves erect, flowers whorled. Alisma.
Leaves floating, flowers subsolitary. Elisma.

β. Carpels with two or more ovules.
Leaves erect, carpels connate. Damasonium.

b. Flower-axis convex. Stamens mostly more than 6, sometimes spiral. Carpels arranged in a head, acyclic.

Flowers hermaphrodite. Fruit ribbed, scarcely compressed. Echinodorus.
Flowers diclinous. Fruit strongly compressed.

Sagittaria.


Only British genus (perianth homochlamydeous, persistent): Butomus.


Tribe 1. Stratioteae. Leaves partly submerged. ♀ flowers sessile in the 2-leaved spathe.

Leaves erect narrow serrate. Stratiotes.
Tribe 2. **Hydrochariteae.** Leaves floating. ♀ flowers stalked in the spathe. Leaves orbicular. 

**Hydrocharis.**

*b.* Carpels usually 3. Placentae not projecting far inwards.

*Subfamily 2.** Vallisnerioideae.** Fresh water plants. Perianth often small. Stigma short.

*Tribe.** Hydrilleae.** Leaves 1-nerved, in whorls. ♂ flowers 1–3 in a spathe. Leaves linear, 3 in a whorl.

*Elodea.**

γ. Naked flowers dominant. Stamens rarely, and carpels never, indefinite. (For a see page 10, for β see page 11.)

Order 3. **Glumiflorae.** Grassy herbs with sheathing leaves. Flowers naked, more rarely with perianth of bristles†, in the axils of imbricating bracts (glumes). Gynaecium always 1-locular with one ovule.

Fam. 1. **GRAMINACEAE.** Herbs (grasses). Stems usually terete. Leaves distichous, sheath usually split to the base and furnished with ligule or hairs at junction of sheath and lamina. Flowers in the axils of glumes with 2-nerved ‘palea’ opposite glume, usually monoecious, naked. The lowermost glumes are usually without flowers (empty). Deeply bifid scale (lodiculae) often present opposite palea. Stamens mostly 3. Anthers versatile. Stigmas usually 2, feathery. Fruit a caryopsis†. Seed with copious endosperm. Embryo with peltate enlargement (scutellum) of cotyledon in whose distal

† Oreobolus, a South American genus of Cyperaceae, tribe Rhynchosporae, has a perianth of glume-like tepals.

‡ A caryopsis is a superior achene in which the pericarp and testa are united.
hollow lie the plumule and the radicle, the latter surrounded by a sheath (the Coleorhiza).

Subfamily 1. *Panicoideae*. Spikelets 1-flowered with axis (*rachilla*) not produced beyond flower, rarely 2-flowered, in which case the lower flower is imperfect, when ripe falling off as a whole. (See footnote.)

a. Hilum point-like, spikelets dorsally compressed or terete.


Pedicels of spikelets naked or hairy.  
\(\bigcirc\) *Panicum*.

Pedicels of spikelets with stiff bristles.  
\(\bigcirc\) *Setaria*.

b. Hilum linear, spikelets laterally compressed.

Tribe 2. *Oryzeae*. Empty glumes minute or o. *Stamens* often 6 (but 3 in Brit. Sp.).

Empty glumes absent. Only British genus: *Leersia*.

Subfamily 2. *Poeoideae*. Spikelets 1–many-flowered, when 1-flowered the axis (*rachilla*) is often prolonged beyond the flower, mostly jointed distally to the empty glumes which remain behind when the flowering glumes fall away†. When 2–many-flowered there are always distinct internodes between the flowers.

a. Spikelets with distinct stalks, arranged in panicles, spike-like panicles or racemes. (For \(\beta\) see page 19.)


3rd and 4th glumes empty, awnless, reduced to small scales.  
*Phalaris*.

† In Alopecurus, Polypogon, Holcus and Spartina the spikelets fall as a whole.
3rd and 4th glumes empty, small with dorsal awns.

**Anthoxanthum.**

3rd and 4th glumes, or at any rate the 3rd with a triandrous ♂ flower, almost as long as the 1st and 2nd. Upper flowers hermaphrodite, diandrous. **Hierochloë.**

Tribe 4. *Agrostideae.* Spikelets 1-flowered with two empty glumes. **Pala** 2-nerved.

* Rachilla not produced beyond flowering glume.
* Panicle effuse, fruit included in hardened glume.

**Milium.**

Panicle dense, cylindric, spikelets falling as a whole, flowering glume with dorsal, bent awn. **Alopecurus.**

Panicle dense, cylindric, empty glumes persistent, flowering glume awnless. **Phleum.**

Spikelets dorsally compressed in a simple spike. **Mibora.**

Panicle loose, flowering glume small, membranous. **Agrostis.**

Panicle contracted, spikelets falling as a whole, empty glumes with awns. **Polypogon.**

Rachilla with long silky hairs, empty glumes acuminate. **Calamagrostis.**

**Rachilla produced beyond the flowering glume.**

Empty glumes large, dilated at base, much larger than the minute 4-toothed flowering glume. **Gastridium.**

Empty glumes large, flowering glumes bifid, with slender awns. **Apera.**

Empty glumes large, flowering glumes with awns, rachilla ciliate. **Deyeuxia.**

Spikelets large in dense panicle, rachilla long and silky. **Ammophila.**

Empty glumes with feathery hairs, flowering glume 3-awned. **Lagurus.**

c.
Tribe 5. Aveneae. Spikelets 2—many-flowered. Flowering glumes usually shorter than the two empty glumes, usually with dorsal, rarely apical, bent and twisted awn.

A. Spikelets falling as a whole. **Holcus.**
B. Flowering glumes in fruit becoming detached from the persistent empty glumes.
   a. Rachilla not produced. Flowering glumes awned, 2-toothed. **Aira.**
   b. Rachilla produced. Flowers 2, awn bent in middle, tip clavate. **Corynephorus.**
   Flowers 2, awn straight, acute. **Deschampsia.**
   Flowers 2–6, flowering glumes deeply bifid with twisted awns. **Trisetum.**
   Flowers 2–6, flowering glumes entire or 2-toothed with long awns. **Avena.**
   Flowers 2, upper hermaphrodite, lower \( \ddagger \). **Arrhenatherum.**

Tribe 6. Festuceae. As Aveneae but flowering glumes usually longer than the two empty glumes. Awn absent, or apical and straight.

a. Spikelets 2 or more flowered: rachilla not bearded. Flowering glumes with three broad teeth. **Sieglingia.**

b. Spikelets 2 or more flowered: rachilla with silky hairs. **Phragmites.**

γ. Spikelets subspicate or capitate, with imperfect spikelets on pedicels below them. **Sesleria.**
   Imperfect spikelets ciliate.
   Imperfect spikelets with stiff bristles. **Cynosurus.**
δ. Spikelets 2 or more flowered. Flowering glumes 1 or 3-nerved, all alike.
  Spikelets arranged in a spike-like panicle. Flowering glumes scarious.
  Spikelets conical, terete, in a slender panicle. Flowering glumes cartilaginous.
  Spikelets in effuse panicle, branches whorled. Flowering glumes coriaceous.

Koeleria.

δ. Spikelets 2 or more flowered. Flowering glumes 3–5-nerved, upper empty, convolute.
ε. Spikelets 3–many-flowered. Flowering glumes 5 or more nerved.
  Spikelets few-flowered, clustered in secund panicles.
Catabrosa.

Dactylis.

Spikelets paniced, drooping. Glumes broad, obtuse.

Briza.

Spikelets paniced. Flowering glumes compressed, keeled, tips nerved, without awns.
  Spikelets very many flowered. Flowering glumes convex, obtuse, tips without nerves or awn.
Glyceria.
  Spikelets in racemes or spike-like panicles. Flowering glumes convex, tip nerved, acute or with awn. Ovary glabrous.
  Spikelets many-flowered, in panicles. Flowering glumes convex. Ovary tip villous.
  Spikelets subsessile, distichous. Flowering glumes convex. Ovary tip villous.
  Poa.
Bromus.

β. Spikelets in two rows which approach one another forming a unilateral spike or raceme with unjointed axis. (For δ see page 16.)

Cyperaceae

Spikelets falling as a whole. Spikes solitary.   
\textbf{Spartina}.

Empty glumes persistent. Spikes digitate. \textbf{Cynodon}.
\(\gamma\). \textit{Spikelets} in two opposite rows. (For \(\alpha\) see page 16, for \(\beta\) see page 19.)

Tribe 8. \textit{Hordeae}. \textit{Spikelets} sessile in notches on a simple \textit{rachis} forming a \textit{spike}.
\(\alpha\). Style 1. Spikes unilateral. \textbf{Nardus}.
\(\beta\). Styles 2. Spikes bilateral.

I. Spikelets solitary in notches of rachis.
† Spikelets with the narrow sides to rachis. \textbf{Lolium}.
‡‡ Spikelets inserted broadside to the rachis.

Spikelets 1–2-flowered in a slender spike. Spikelets sunken in the notches. \textbf{Lepturus}.
Spike stout. Spikelets not sunken in the notches.

\textbf{Triticum} (incl. \textit{Agropyrum} and \textit{*Secale}).

II. 2–6 spikelets in each notch.
1. Spikelets 1-flowered. \textbf{Hordeum}.
2. Spikelets 2–many-flowered. \textbf{Elymus}.

Fam. 2. \textit{Cyperaceae}. Grass-like herbs often with triangular stems. \textit{Leaves} with closed sheaths. \textit{Ligule} usually absent. \textit{Flowers} in spikelets or spikelet-like cymes, monoclinous or diclinous, naked or rarely with homochlamydeous perianth. \textit{Stamens} mostly 3–1, rarely more. \textit{Anthers} basifixed. \textit{Carpels} (3–2). \textit{Styles} 3–2 with filiform \textit{stigmas}. \textit{Fruit} an achene with free \textit{seed}.

Subfamily 1. \textit{Scirpoideae}. \textit{Spikelets} with many hermaphrodite flowers. Individual flowers in the spikelet may be diclinous. \textit{Perianth} present or absent.

Tribe 1. \textit{Scirpeae}. No \textit{bracteoles}.
Only British genus: **Cyperus**.

Spikelets solitary, terminal. Bristles 3–8, included. Style thickened at base. **Heleocharis**.
Spikelets clustered and lateral. Bristles 0, or 3–8, included. Style not thickened at base. **Scirpus**.
Spikelets solitary or clustered, terminal. Bristles very long, cottony. **Eriophorum**.

Subfamily 2. *Rhynchosporoideae*. Flowers in spikelet-like cymes (*pseudo-spikelets*) which are arranged in spikes or heads, mono- or diclinous. *Perianth bristles* present or absent.

*Pseudo-spikelets* terete. Bristles slender or absent. **Rhynchospora**.
*Pseudo-spikelets* compressed; glumes distichous. **Schoenus**.
*Pseudo-spikelets* terete. Bristles 0. **Fruit obtuse**.

Subfamily 3. *Caricoideae*. Flowers always naked, diclinous, in many-flowered (rarely few-flowered), mono- or diclinous spikelets. ♀ flower enclosed in modified bracteole (*utriculus*).
Spikelets 1–2-flowered. **Kobresia**.
Spikelets many-flowered. **Carex**.

*b. Achlamydeous flowers* rare: *their occurrence is mostly due to reduction and is correlated with spathe-development*. *Definite number of stamens and carpels*
dominant, but numerous stamens and more than three carpels often occur. (For a see page 10.)

Order 4. **Spathiflorae.** Mostly sympodial, rarely forming erect stems. (The Lemnaceae are free floating and undifferentiated.) *Flowers* cyclic, haplochlamydeous or diplochlamydeous, homochlamydeous or naked, 3–2-merous, hermaphrodite or dichlinous, often very reduced, always inserted on a *spadix* more or less enveloped by a bract (*spathe*). *Floral bracts* absent.

Fam. 1. **Araceae.** Mostly herbs. *Rhizome* often tuberous. *Leaves* often with netted veins. *Flowers* mono- or dichlinous, rarely dioecious, 2–3-merous, or reduced sometimes to a single *stamen* or *carpel*. *Fruit* usually a berry. *Seed* with fleshy outer integument.

Subfamily 1. **Pothoideae.** Land plants. No *latex* or *raphides* present. *Leaves* distichous or spiral. Lateral nerves of 2nd and 3rd order usually netted. *Flowers* mostly hermaphrodite.


Only British genus: **Acorus.**


Only British genus: **Arum.**
Fam. 2. **Lemnaceae.** Small free-swimming thallloid plants not differentiated into stem and leaves. Flowers monoecious. ♂ flower of one stamen. ♀ of one carpel with 1–6 basal ovules.

Subfamily 1. **Lemnoideae.** Roots present. Inflor-escence with spathe and two ♂ flowers.

Roots several.

Root solitary.

Subfamily 2. **Wolffioideae.** Roots absent. Inflor-escence without spathe and with only one ♂ flower.

**B. Orders with typically pentacyclic flowers.** Whorls typically isomerous, mostly 3-merous.

(For A see page 10.)

a. Flowers homochlamydeous to heterochlamydeous, very rarely naked. Bracteoid perianths still occur but petaloid perianths predominate. Hypogyny and Actinomorphy preponderate. (For b see page 29.)

Order 5. **Farinosae.** Mostly herbs, rarely with well-developed stem. Flowers cyclic, homo- or heterochlamydeous, 3 or 2-merous. General floral formula $T_3 + T_3$ (more rarely $K_3 + C_3$), $A_3 + 3$, $G(3)$. One whorl, or all but one of the stamens may be absent. Ovules orthotropous, but anatropous ovules also occur. Endosperm mealy.

with a pendulous orthotropous ovule. Fruit a loculicidal capsule.

Subfamily Eriocauloideae. Stamens 4 or 6. Perianth-segments free, inner ones with gland near apex.

Only British genus: Eriocaulon.

Order 6. Liliiflorae. Characters of Farinosae, but ovules mostly anatropous, and seeds usually with fleshy or cartilaginous endosperm. Exceptionally 2 or 4-merous flowers occur.


Suborder 2. Liliineae. Perianth mostly petaloid, homo- very rarely heterochlamydeous. Inner circle of stamens present. Endosperm with no starch.

Fam. 2. Liliaceae. Flowers usually homochlamydeous and monoclinous. Perianth usually petaloid, segments free or united. Stamens 6 (3 in Ruscus). Ovary usually superior, mostly 3-loc with axile placentae. Fruit various.
Subfamily 1. **Melanthioideae.** Rhizome or corm. Inflorescence terminal. Anthers extrorse and capsule septicidal, or anthers intorse and capsule septicidal, or anthers extrorse and capsule loculicidal, rarely anthers intorse and capsule loculicidal. Fruit never a berry.

a. Rhizome. Seeds long, flat and winged, or angled.


b. Corm, or short rhizome. Seeds subglobose.


Subfamily 3. **Allioideae.** Bulb or short rhizome. Inflorescence a cymose umbel enclosed by two broad, sometimes united, leaves, more rarely subtended by two narrow bracts, or reduced to a single flower.

Tribe 3. **Allieae.** Bulb, or stem with thickened base. Perianth free or united. Stamens 6 or only 3 fertile. Inflorescence few-flowered, subtended by two free bracts. Gagea.
Inflorescence usually many-flowered, subtended by two coriaceous, mostly united, bracts. *Allium.*


Tribe 4. *Tulipeae.* Bulb, imbricated or tunicated. Stem bearing several foliage leaves, rarely only one. Flowers few, axillary, or solitary and terminal.

a. Anthers versatile.
   Flowers large. Nectary median or obscure. *Lilium.*

b. Anthers basifixed.
   Flowers large, drooping, segments not reflexed. Nectary oblong.
   As *Fritillaria* but flowers erect and nectary absent. *Fritillaria.*

   Flowers few, small. Perianth-segments spreading. *Tulipa.*

   As *Fritillaria* but flowers erect and nectary absent. *Tulipa.*

   Flowers few, small. Perianth-segments spreading. *Lloydia.*


1. Perianth-segments free or nearly so.
   Filament filiform or flattened at base. *Scilla.*
   Filaments flattened throughout. *Ornithogalum.*

2. Perianth-segments united.
   [Corolla funnel-shaped, not contracted, all flowers fertile. *Hyacinthus.*]

Subfamily 5. *Asparagoideae.* Rhizome subterranean, ending in flowering shoots, or monopodial with lateral flowering shoots. Fruit a berry.

a. Flowers homochlamydeous.
Tribe 6. *Asparageae*. Rhizome ending in leafy stems. **Cauline leaves** small, scale-like, subtending narrow or broad leaf-like shoots (*Phylloclades*).


Stem shrubby. Flowers on the phylloclades dioecious. Stamens 3 with connate filaments. **Ruscus**.

Tribe 7. *Polygonateae*. As *Asparageae*, but stem with large, broad **foliage leaves**.

Leaves many. Flowers axillary. Perianth tubular 6-cleft. **Polygonatum**.

Leaves 2. Flowers in terminal racemes. Perianth 4-partite. **Maianthemum**.

Tribe 8. *Convallarieae*. Rhizome monopodial with lateral **inflorescence-axes**.

Subtribe *Convallariinae*. Style ending in one small stigma. **Convallaria**.

b. Flowers heterochlamydeous.

Tribe 9. *Parideae*. Foliage leaves net-veined forming a whorl. **Flowers** solitary or umbellate. **Fruit** a berry.

Leaves 4 or more in a whorl. Flowers 4 or more merous. Only British genus: **Paris**.

Fam. 3. **AMARYLLIDACEAE**. Resembling, in essential points, *Liliaceae*. **Anthers** mostly intorse. A **corona**, formed of staminal stipules, is often present. **Ovary** mostly inferior. **Placentation** axile. **Ovules** anatropous in two rows on each placenta. **Fruit** a loculicidal capsule or berry. **Seeds** usually few.

Subfamily 1. *Amaryllidoideae*. **Bulb**. Scape leafless with a solitary flower, or involucrate umbellate inflorescence.

Subtribe *Galanthinae*. Perianth actinomorphic, without tube. Loculi of ovary with \(\infty\) ovules.

Perianth-segments all equal. \(\text{Leucojum}\).

Outer perianth-segments larger than inner.

\(\text{Galanthus}\).

Tribe 2. *Narcisseae*. *Corona* present as tube, ring or scales.

Subtribe *Narcissinae*. Stamens included in the cup-like corona.

\(\text{Narcissus}\).


Tribe *Dioscoreae*. *Flowers* diclinous. *Ovules* 2 in each loculus.

Only British genus (berry imperfectly 3-celled):

\(\text{Tamus}\).

Suborder 3. *Iridineae*. As Liliineae, but *inner whorl of stamens* aborted.

Fam. 5. *Iridaceae*. Mostly herbs with equitant leaves and terminal inflorescences. *Flowers* hermaphrodite, homo- or heterochlamydeous 3-merous, actinomorphic or zygomorphic. *Stamens* always 3 (the outer whorl). *Anthers* extrorse. \(G(3)\) with many anatropous ovules.
on axile placentae†. *Styles* 3, often divided and leaf-like. *Capsule* loculicidal with globose or angular seeds.

Subfamily 1. *Crocoideae*. Small herbs often with underground flower stalks. *Flowers* solitary, or several axillary around a terminal flower.


Scape 0. Perianth tube long. *©Crocus.*


Only British genus: *Iris.*

Tribe 2. *Sisyrinchieae*. As above, but *style-arms* mostly terete.

Only British genus: *©Sisyrinchium.*

Subfamily 3. *Ixioidaeae*. As *Iridoideae*, but only one flower enclosed in each spathe.

Tribe *Gladioleae*. *Flowers* strongly zygomorphic, often curved.

Only British genus: *Gladiolus.*

b. *Flowers* homochlamydeous to heterochlamydeous but in the first case the perianth is petaloid. *Epigyny* throughout. *Zygomorphy* dominant. (For a see page 23.)

Order 7. *Microspermae*. *Flowers* cyclic, hom- or heterochlamydeous, 3-merous, typically diplostemonous but *androecium* often shows marked reduction.

† The Mediterranean genus *Hermodactylus* has a 1-loc ovary with parietal placentae. In all other respects this monotypic genus is very near to *Iris.*
Orchidaceae

Ovary inferior, 3 or 1-loc with numerous, minute ovules. Endosperm present or absent.

Suborder GYNANDRAE. Flowers always zygomorphic, no endosperm.

Family ORCHIDACEAE. Perennial herbs. Flowers homo- or heterochlamydeous, typically 3-merous, almost invariably monoclinous, zygomorphic, usually resupinate by twisting of the ovary so that the posterior petal occupies an anterior position and is often developed into a labellum. Of the stamens usually only the anterior† one of the outer whorl is fertile. In subfamily Diandrae the two lateral stamens of the inner whorl are usually fertile. Frequently (e.g. in Orchis) the two anterior stamens of the inner whorl are represented by staminodes on the sides of the column. Pollen cohering in masses (Pollinia). Carpels (3) sunk in the floral axis which is prolonged beyond the insertion of the perianth into a column which bears the stamens. Stigmas 3, usually on the surface of the column, the posterior one rudimentary or developed into a beak-like structure (rostellum) beneath the anther or between its cells. Ovary mostly 1-loc with 3 parietal placentae and ∞ ovules. Fruit a capsule with very numerous, minute seeds without endosperm. Embryo not, or only slightly, differentiated.

Subfamily 1. Pleonandraceae (Diandrae). The two lateral (rarely all 3) stamens of the inner whorl fertile. All three stigmas similar and receptive.

† The terms anterior and posterior in this description refer to position before the occurrence of resupination.

Subfamily 2. *Monandraceae*. Anterior stamen of outer whorl fertile. Lateral stigmas receptive, odd one rudimentary or developed as rostellum.

a. Basitonae. Anther confluent with column. Pollinia with appendages at base which are in connection with glands in rostellum.


Spur long: both glands in a single pouch. Orchis.
Spur absent: both glands in one pouch. Aceras.
Spur absent: glands in two distinct pouches. Ophrys.

Subtribe *Gymnadeniinae*. As above, but pollen masses naked or surrounded by processes of the anthers.
Without spur. Herminium.
With spur. Habenaria.


(a) Acranthae: Inflorescences terminal on branches whose basal portions make up a sympodial shoot. [(β) Pleuranthae (main axis sympodial but flowers borne on special lateral axes): not represented in Britain.]

Tribe 3. Neottieae (only tribe).

Subtribe 1. Cephalantherinae. Labellum with distinct proximal lobe (hypochilium) which is often spurred. Anthers erect. Rostellum short or absent.

α. Stem leafy: no spur.

Flowers in racemes, ovary straight. Epipactis.
Flowers in spikes, ovary twisted. Cephalanthera.

β. Stem scaly, without foliage leaves, labellum spurred.

Labellum turned upwards, column short. Epipogon.

Subtribe 2. Spiranthinae. Leaves soft, net-veined. Anther as long as the beaked rostellum and lying against it. Pollinia not divided into distinct masses.

A. Median sepal and petals forming a helmet surrounding the base of the labellum.

Spike spirally twisted. Spiranthes.
B. Sepals and petals standing apart.

Scape with two opposite leaves. Listera.
Scape brown, leafless. Neottia.

Subtribe 3. Physurinae. As above but pollinia divided into numerous distinct masses.

Rhizome creeping, leaves several. Goodyera.

II. Duplicatae. Leaves folded in bud.


A. Foliage leaves present.

Column slender, bent forwards. Anther deciduous. Liparis.

Class 2. **DICOTYLEDONES.** *Embryo* usually with two cotyledons. *Stem* with open bundles. *Leaves* usually with reticulate venation. *Flowers* often 4–5-merous.

Subclass 1. **ARCHICHLAMYDEAE.** *Perianth* simple or absent. *Flowers* either achlamydeous, or haplochlamydeous, or diplochlamydeous with polypetalous corolla. *Sympetaly* rare (marked in *Cotyledon*). *Apopetaly* occurs not infrequently.

* a. **Amentiflorae** (Moss). Mostly trees or shrubs. ♂ flowers usually, and ♀ flowers often, in catkins. *Perianth* absent or haplochlamydeous and bracteoid. (For b see p. 37.)

Order 1. **Salicales.** Deciduous trees or shrubs. *Leaves* alternate, stipulate, seldom deeply lobed. *Flowers* dioecious, both sexes in simple catkins. *Perianth* cup- or saucer-shaped, or modified into one or two or rarely more nectaries. *Stamens* 2–∞, filaments free or rarely connate. *Carpels* (2). *Ovary* 1-locular with ∞ ovules on two parietal placentae. *Ovules* anatropous with two integuments. *Fruit* a loculicidal capsule quite free from the bracts. *Seeds* small with basal tuft of hairs. *Endosperm* 0.

Only family: **Salicaceae.**

† Engler has no names for these groups, simply referring to them as a, b, c and d. The names used in this book are those made use of by Dr Moss in his lectures at Cambridge.
Myricaceae, Juglandaceae

Leaves usually broad. Bracts laciniate. Perianth cup-like or saucer-like, more or less oblique. *Populus.*


Fam. **Myricaceae.**

Only British genus: *Myrica.*


Fam. **Juglandaceae.** ♀ flower with perianth which is fused with the ovary and also with the bract and bracteoles.

*Juglans.*

Order 4. **Fagales.** Trees or shrubs. *Leaves* alternate, simple, with stipular, usually caducous bud-scales. *Flowers* homochlamydeous or achenieous, mostly diclinous and monoecious. ♀ flowers in catkins. ♀ flowers in catkins or small spikes, or 1–3 seated in an involucre of free or connate bracts. *Stamens* often
opposite the tepals. **Carpels** (2–6). **Ovary** sub-inferior, usually more or less completely 2–3-locular (after fertilisation) with 1–2 pendulous, anatropous, parietal ovules in each loculus. **Fruit** usually a nut. **Endosperm** o.

**Fam. 1. Betulaceae.** Flowers usually appearing before leaves. **Perianth** present in flowers of only one sex. ♂ **catkins** compound. ♂ **flowers** united to their bracts. **Stamens** 2–10. **Filaments** often dividing into two, each branch bearing a half-anther. ♀ **catkins** often minute. **Carpels** (2). **Styles** 2.

**Tribe 1. Corylaceae.** ♂ **flowers** without perianth. ♀ **flowers** with perianth. **Fruit** not winged, enclosed in the enlarged, herbaceous bracts.

Leaves in bud folded parallel to lateral nerves. ♀ spike large. Fruiting bracts open 3-lobed. **Carpinus.**

Leaves in bud folded parallel to midrib. ♀ spike minute. Fruiting bracts forming a cupule. **Corylus.**

**Tribe 2. Betuleae.** ♂ **flowers** in dichasia, with perianth. ♀ **flowers** without perianth. **Fruit** usually winged.

Filaments branched. ♀ **catkins** falling at end of the first summer. **Betula.**

Filaments simple. Empty ♀ **catkins** persistent for more than one year. **Alnus.**

**Fam. 2. Fagaceae.** Flowers and leaves appearing together, or flowers appearing after leaves. **Flowers** of both sexes with perianth of 4–7 connate tepals. ♂ **catkins** simple or compound. **Stamens** 4–14. ♀ **flowers** in 3–2-flowered dichasia or solitary. **Carpels** usually 3–4. **Styles** 3–4. **Fruit** surrounded by involucre (cupule).
Tribe 1. Fagaceae. ♀ catkins globose. Two angular nuts in each cupule.
Only British genus: Fagus.


Order 5. Urticales. Herbs, shrubs or trees with stipulate, often roughly hairy, leaves. Inflorescence mostly cymose, but catkins still occur (Urtica). Flowers cyclic, homochlamydeous, rarely naked. Stamens opposite the tepals. Carpels 2–1, superior. Ovary usually 1-locular, with one ovule with two integuments.


Only British genus (fruit broadly winged): Ulmus.

Fam. 2. Cannabaceae. Aromatic herbs without latex. Leaves palmately nerved, and lobed or divided. Stipules persistent. Flowers dioecious. ♂ flowers, tepals 5, stamens 5. ♀ flowers with perianth of low entire mar-


Fam. 3. URTICACEAE. Mostly herbs without latex. Stinging hairs often present. Flowers diclinous. Perianth of both sexes usually of four free tepals. Stamens as many incurved in bud. Carpel 1. Fruit a nut enclosed by inner two or by all the tepals. Endosperm o. Embryo straight.


Only British genus (leaves opposite, stigma brush-like): Urtica.

Tribe 2. Parietarieae. No stinging hairs. ♀ perianth (or involucre?) tubular.

Only British genus: Parietaria.

b. Petaloideae (Moss). Flowers haplochlamydeous, perianth often petaloid. Diplochlamydeous flowers rare (Rumex). (For a see page 33, for c see page 40.)

Order 6. Santalales. Partial or entire parasites. Leaves entire, exstipulate. Flowers cyclic, homochlamydeous with stamens opposite tepals. Carpels (2–3), rarely (1). One ovule to each carpel, pendulous from apex of loculus or from free central placenta, or placenta and ovules not differentiated. One or no integuments.

Suborder 1. SANTALINEAE. Ovules differentiated from placenta, often without integument.
Fam. SANTALACEAE. Chlorophyllous hemi-parasites. Leaves mostly alternate, entire, exstipulate. Tepals 4–5, valvate in bud, bracteoid or petaloid, united below. Stamens adnate to tepals. Ovary 1-locular with a columnar, free central placenta from which are suspended the 1–3 ovules which are without integument. Fruit indehiscent, with one endospermous seed.

Tribe Thesieae. Perianth epigynous. Tube long.
Only British genus: Thesium.

Suborder 2. LORANTHINEAE. Ovules mostly not differentiated.

Fam. LORANTHACEAE. Evergreen shrubs, mostly parasitic on trees. Leaves thick, usually opposite and exstipulate. Tepals usually 4, valvate, fleshy. Floral axis united to gynaecium, often forming a crenate ring (calyculus). Ovary 1-loc, usually with only one fertile embryo sac. Fruit a pseudo-berry, inner layer of axis becoming sticky.

Subfamily Viscoideae. Flowers diclinous. No distinct calyculus.

Tribe Visceae. Flowers single or in groups in the axils of persistent bracts. Placenta basal.
Only British genus: Viscum.


Fam. ARISTOLOCHIACEAE. Herbs or lianes, with alternate, long-stalked, usually cordate or reniform, exstipulate leaves. Flowers usually hermaphrodite, actinomorphic or zygomorphic. Perianth petaloid, with three
lobes or one lip. Stamens usually 6 or 12, free or united to the style. Carpels \((4-6)\) with numerous axile anatropous ovules with two integuments. Fruit a capsule. Seed with small embryo in copious endosperm.


Only genus (perianth campanulate): \(\text{\textcopyright Asarum}\).


Only British genus (perianth tubular, dilated at base): \(*Aristolochia*.


Fam. Polygonaceae. Herbs, rarely shrubs or trees. Leaves usually entire with scarious or fleshy amplexicaul, stipular sheath. Flowers small in compound inflorescences, cyclic or partially spiral, usually hermaphrodite. Tepals 3–6 free. Stamens 5–9. G(3) or (2) with as many styles. Fruit a nut. Seed with copious mealy endosperm. Embryo straight or curved.


Tribe Rumiceae. Leaves with conspicuous sheath. Stamens in one whorl. Fruit not winged. \(\text{Rumex}\).

Stamens in two whorls. Fruit winged. \(\text{Rheum}\) (including \text{Oxyria}).

Chenopodiaceae

Tribe Polygonae. Herbs, more rarely undershrubs.

Only British genus (tepals free, all erect in fruit):

*Polygonum* (including *Fagopyrum*).

c. (Consisting of the one order Centrospermae.) Corolla usually haplochlamydeous, sepaloid or petaloid. Heterochlamydy, however, is not uncommon. (For d, Heterochlamydeae, see page 45, for b page 37.)

Order 9. Centrospermae. Mostly herbs, often with peculiar secondary thickening. *Leaves* often entire, usually exstipulate. *Stipules* scarious if present. *Flowers* homo- or heterochlamydeous. *Stamens* as many as and opposite to perianth segments or \( \infty - 1 \). *Carpels* \( \infty - 1 \), usually united. *Ovary* mostly superior and 1-loc with \( 1-\infty \) campylotropous ovules. *Placentation* basal or free central. Two integuments present. *Embryo* curved. *Seeds* often reniform and with granulate testa. *Perisperm* often present.


Fam. 1. Chenopodiaceae. Herbs, rarely shrubs, often with ‘bladder-hairs’ (‘mealiness’). *Leaves* alternate, exstipulate, fleshy, entire or irregularly lobed, sometimes much reduced. *Flowers* small, homochlamydeous. *Tepals* 5, 3, or 1, valvate. *Stamens* as many or fewer opposite the tepals, bent inwards in bud. *Carpels* (2), rarely (3-5). *Ovary* 1-loc with one basal ovule. *Fruit* a nutlet or pyxidium enclosed in persistent perianth.
Amarantaceae

A. Cyclolobeae. Embryo annular or horse-shoe shaped.

   Only British genus: Beta.

   Only British genus: Chenopodium.

Tribe 3. Atripliceae. Flowers usually diclinous. ♂ with perianth and without bracteoles. ♀ without perianth and with persistent bracteoles.
   Only British genus: Atriplex.

   Only British genus: Salicornia.

B. Spirolobeae. Embryo spirally twisted.

   Only British genus: Suaeda.

   Only British genus: Salsola.

*Fam. 2. Amaranthaceae. Very near Chenopodiaceae but perianth not herbaceous, but scarious and coloured; the tepals often end in awns.
*Amaranthus.

Fam. 3. *Aizoaceae. Usually herbs, often with fleshy leaves. Stipules absent or scarious. Flowers usually haplochlamydeous. Perianth segments free or united, sepaloid. Stamens 5 or more, the outer ones sometimes represented by petaloid staminodes. Carpels (2–∞). Ovary 2–∞-loc, rarely 1-loc. Placentation basal or free central (parietal in *Mesembryanthemum*).

Tribe *Mesembryanthemeeae*. Ovary inferior. Staminodes present or not.

Staminodes very numerous, petaloid.

*Mesembryanthemum*.

Suborder 3. **Portulacineae. Flowers heterochlamydeous. Sepals† 2. Petals 4–5.**


A. Stamens 3–5. Ovary superior.

Petals free, stamens 5. *Claytonia.*


B. Stamens numerous. Ovary subinferior.

*Portulaca.*

† These structures may also be regarded as bracteoles. In the N. Am. genus *Lewisia* they are 4–8 in number, subulate, and placed on the scape below the insertion of the perianth.
Suborder 4. Caryophyllineae. *Flowers* heterochlamydeous with equal number of sepals and petals, cyclic throughout, sometimes apetalous.

Fam. 5. Caryophyllaceae. Herbs, rarely shrubs, with opposite, rarely spiral, entire leaves. *Stipules* o or scarious. *Flowers* mostly in dichasia, cyclic, usually heterochlamydeous, 5 rarely 4-merous. *Stamens* usually in two whorls. *Carpels* \((5-2)\) with \(1-\infty\) ovules on a free central or basal placenta. *Fruit* usually capsular.


b. Petals inconspicuous or absent. Fruit indehiscent.
   A. Sepals obtuse, flat, green.
      Leaves linear, opposite and spiral. Stigmas 3.
      Corrigiola.
   Leaves ovate-oblong, opposite. Stigmas 2.
      Herniaria.
   B. Sepals awned, laterally compressed, white.
      Illecebrum.

Tribe 5. Sclerantheae. Stipules 0. Petals usually 0. Ovules 1–2.
   Only British genus (leaves opposite, connate at base):
      Scleranthus.


   A. Fruit a capsule.
      Carpels oligomerous, or if isomerous opposite sepals. Capsule with septa. Teeth as many as styles.
      Viscaria.
      As Viscaria, but teeth twice as many as styles.
      Silene.
      Capsule with no septa. Teeth as many as styles.
      Lychnis.
      As Lychnis, but teeth twice as many as styles.
      Melandryum.
   B. Fruit a berry.
      *Cucubalus.

Dianthus (including Tunica†).


d. Heterochlamydeae (Moss). Orders with predominant heterochlamydy. (For c see page 40.)

a. Apocarpy and Hypogyny predominant. (For β see page 48.)

Order 10. Ranales. Flowers spiral, spirocyclic, or cyclic, haplo- to heterochlamydeous, hypogynous to epigynous, actinomorphic or zygomorphic. Stamens usually ∞. Carpels ∞−1, usually free.

Suborder 1. Nymphaeineae. Flowers predominantly spiral. Ovules usually scattered over the inner surface of the carpels but sometimes solitary at the apex (Ceratophyllaceae).

Fam. 1. Nymphaeaceae. Aquatic herbs. Leaves floating, often peltate. Flowers solitary spiral, spirocyclic or cyclic, homo- or heterochlamydeous, hermaphrodite, actinomorphic. Flower-axis convex, or hollow and united to gynaecium. P 6−∞, A 6−∞, G 3−∞ free or united, each with 1−∞ ovules on their inner surface. Ovules with two integuments. Seeds often with aril. Cotyledons thick.

Subfamily Nymphaeoidaeae. Flowers spirocyclic. Carpels ∞, with ∞ ovules completely covering the septa. Endosperm and perisperm present.

† An ill-defined genus differing from Dianthus in having smaller flowers and broad, membranous sepaline commissures.


Suborder 2. **RANUNCULINEAE.** *Flowers* spiral to cyclic. *Ovules* on the ventral suture.

Fam. 3. **RANUNCULACEAE.** Mostly acrid herbs. *Leaves* often divided. *Flowers* rarely completely cyclic, haplo- or heterochlamydeous, in first case with petaloid perianth between which and androecium honey-leaves are often present, hermaphrodite, actinomorphic or zygomorphic. *Stamens* usually numerous, free. *Carpels* ∞–1 usually free with ∞–1 ovules. *Fruit* of one-seeded achenes or many-seeded follicles, or a berry (*Actaea*). *Endosperm* copious.

A. *Ovules* on both sides of ventral suture, rarely solitary. *Fruit* a follicle with ∞–1 seeds.


Only genus: *Paeonia.*

I. Honey-leaves without spur. Sometimes absent.
A. Leaves undivided or merely lobed. Honey-leaves absent.
B. Leaves deeply lobed or compound. Honey-leaves present.
   † Leaves palmately lobed or compound.
   a. Honey-leaves flat with naked honey-pits.
      *Trollius*.

b. Honey-leaves tubular, at least at base.
Leaves palmately divided, sepals membranous, deciduous.
   *Eranthis*.
Leaves pedate. Sepals herbaceous, persistent.
   *Helleborus*.
   †† Leaves doubly ternate or pinnate, fruit a berry.
      *Actaea*.

II. Honey-leaves with spur.
1. Flowers actinomorphic with five honey-leaves.
   *Aquilegia*.
2. Flowers zygomorphic with two honey-leaves.
Honey-leaves sessile, dorsal sepal spurred.
   *Delphinium*.
Honey-leaves stalked, dorsal sepal hooded.
    *Aconitum*.

B. *Ovule* solitary at base of ventral suture. *Achene* one-seeded.

Tribe 3. *Anemoneae* (only tribe).
Herbs. Leaves spiral. Sepals 4–5, inconspicuous.
Honey-leaves 0.
*Thalictrum*.
Berberidaceae


Fam. 4. Berberidaceae. Herbs, shrubs, or trees. Leaves simple or compound. Flowers solitary or racemose, cyclic, homo- or heterochlamydeous, hermaphro-dite 3–2-merous, actinomorphic. Perianth with 2–4 whorls, two whorls of honey-leaves often present. Stamens in two whorls, anthers opening by lids or valves. Carpel 1, rarely several, with ∞–1 ovules on ventral suture or basal. Two integuments. Fruit a berry. Seed with endosperm.

Subfamily Berberidoideae. Leaves pinnate, or terminal leaflet alone present. Honey-leaves present.


Only British genus (flowers 3-merous, fruit a berry): Berberis.

*Tribe 2. Epimedieae. Inflorescence terminal.


β. Syncarpy and Hypogyny dominant. (For α see page 45, for γ see page 54.)
Papaveraceae

Order II. Rhoeadales. Usually herbs. *Flowers* often racemose, cyclic (except androecium in some cases), usually heterochlamydeous, hypogynous, actinomorphic or zygomorphic. *Carpels* (∞−2). *Ovules* with two integuments.


Tribe 1. Chelidonieae. *Latex* yellowish or reddish. *Style* ending in two undivided branches which alternate with the *placentae*. *Stigmatic surface* within and on the edges of these branches.

Only British genus: ♂Chelidonium.

Tribe 2. Papavereae. *Latex* yellow or white. *Stigmas* lying above the *placentae*.

a. Fruit long, dehiscing to the base. *Glaucium.*

Fruit with septum.

Fruit with no septum. *Flowers* violet. *Roemeria.*


Stigma subsessile, on a disc. *Papaver.*

c.
Subfamily 2. *Fumarioideae*. Flowers mostly transversely zygomorphic. One of two outer petals gibbous or spurred. Stamens opposite them, each stamen divided from the base into three. Ovules numerous, fruit a 2-valved capsule. **Corydalis.** Ovules 2, fruit 1-seeded, indehiscent. **Fumaria.**

Suborder 2. *Capparidinae*. Flowers heterochlamydeous. Sepals 4 or more.


Position of cotyledons and radicle as follows:
- o  ||  notorhizal (radicle incumbent).
- o  =  pleurorhizal (radicle accumbent).
- o  >>  orthoplocous (cotyledons conduplicate).

The following arrangement of the British Cruciferae is according to de Candolle and is adapted from Hooker’s *Students’ Flora*, ed. 3. See also *Syllabus*, ed. 7, p. 198, where another arrangement is given.

A. Siliquosae. Pods usually much longer than broad, dehiscent throughout their whole length, not compressed at right angles to septum.

Tribe 1. *Arabideae* (Siliquosae pleurorhizae). Seeds 1-seriate (2-seriate in Arabis and Nasturtium). Coty-
ledons flat. Radicle accumbent o =. (Flowers white, yellow or lilac.)

a. Stigmatic lobes erect, or decurrent to the style. Matthiola.

β. Stigma small, simple, terminal.
Hairs simple or o. Pods terete, valves turgid, not elastic. Seeds minute, 2-seriate. Nasturtium.
Pods flat, valves 1-nerved, not elastic. Flowers mostly white. Arabis.

Tribe 2. Sisymbrieae (Siliquosae notorhizae). Seeds usually 1-seriate. Cotyledons flat. Radicle incumbent o ||. (Flowers as above.)

Pods compressed. Seeds 2-seriate, compressed.

**Diplotaxis.**

B. Siliculosae. *Pods* short, dehiscent through their whole length.

a. Latisectae. *Pods* compressed parallel to the replum, which is hence as broad as the pod's greatest diameter.


Pods oblong, compressed, many-seeded.

**Draba** (including *Erophila*).

Pods circular, 2–8-seeded.

* *Alyssum.*

Pods globose, many-seeded.

* *Cochlearia.*


Tall herbs, flowers small, cauline leaves auricled.

* *Camelina.*


Scapigerous water-herb with subulate leaves.

* *Subularia.*

b. Angustisectae. *Pod* much compressed at right angles to replum, which is hence narrow.


* *Thlaspi.*

Pods orbicular. Petals white or lilac, very unequal. Filaments without scales.

* *Iberis.*
Pods oblong. Petals white, unequal. Filaments with scales.  
**Teesdalia.**

**Hutchinsia.**

Tribe 8. *Lepidieae.* **Cotyledons** straight, incurved or longitudinally folded. *Radicle* incumbent. (Flowers white.)

Pods many-seeded.  
**Capsella.**  
Pods 2–4-seeded.  
**Lepidium.**


Fruit indehiscent, 2-seeded.  
**Coronopus.**

C. Nucamentaceae. **Pods** indehiscent, 1-celled, 1-seeded.

Only British genus:  
**Isatis.**

D. Lomentaceae. *Fruit* with transverse dissepi-ments, separating into 1-seeded joints.

Tribe 11. *Cakilineae* (Lomentaceae pleurorhizae o —). *Radicle* accumbent. **Cotyledons** flat.

Pods compressed, of two dissimilar joints.  
Only genus:  
**Cakile.**


Pods of a lower slender seedless and an upper globose 1-seeded joint.  
**Crambe.**

Pods elongate, of 2–several similar joints.  
**Raphanus.**


Only British genus: Reseda.

Order 12. Sarraceniales. Herbs with spiral leaves adapted to insect catching. Flowers spiro-cyclic to cyclic, homo- or heterochlamydeous, hypogynous, actinomorphic. Carpels (3-5) with parietal or axile placentation and ∞ ovules. Seeds minute with endosperm.


Only British genus: Drosera.

γ. Apocarpy and Hypogyny still occur but Perigyny becomes more frequent. By sinking of the Gynaecium into the hollow flower-axis Syncarpy and Epigynous insertion of the perianth and stamens also takes place. (For β see page 48, for δ see page 61.)

Order 13. Rosales. Flowers cyclic, rarely spiro-cyclic (Rosaceae—Rosoideae), usually heterochlamydeous and actinomorphic. Carpels often free. Placentae
Crassulaceae, Saxifragaceae

sometimes thickened, usually with \( \infty \) ovules.—Most of the families of this order are very difficult to demarcate.

Suborder 1. Saxifragineae. Carpels as many as petals or fewer. Endosperm mostly copious (scanty in Crassulaceae).


A. Obdiplostemonous.
* Petals free.
  Leaves scattered or 2–3 in a whorl. Flowers 4–5-merous.
  *Sempervivum.
  ** Corolla tubular, 5-lobed.

B. Haplostemonous.
  Leaves opposite. Flowers 3–5-merous.
  Crassula (including Tillaea).

Fam. 2. Saxifragaceae. Mostly herbs. Leaves usually spiral. Stipules absent or present as outgrowths from the leaf-sheath. Flowers cyclic, usually heterochlamydeous and 5-merous (but Carpels mostly oligomerous), hermaphrodite, actinomorphic. Flower-axis convex, flat, or concave, in the latter case usually united by its whole length to the carpels. Stamens usually
obdiplostemonous, but sometimes haplostemonous, more rarely \( \infty \). Carpels seldom free and as many as petals, mostly fewer, often two. Styles mostly free. Ovary 2–1-loc with swollen placentae bearing \( \infty \) ovules in several rows. Seeds minute with copious endosperm and small embryo.


Tribe 1. Saxifrageae. Carpels rarely free, but styles always free.

Flowers 5-merous with corolla. Placentation axile.

Saxifraga.

Flowers 4-merous with no corolla. Placentation parietal.

Chrysosplenium.


Parnassia.


Only genus:

Ribes.

Suborder 2. Rosineae. Carpels \( \infty -1 \). Ovules with two integuments. Endosperm scanty or absent.

Fam. 3. Platanaceae. Trees with bark separating in large scales. Leaves spiral, 3–5-lobed, with large connate stipules. Flowers in globose heads, diclinous, cyclic, heterochlamydeous, actinomorphic, 3–8-merous, typically isomerous with four alternating whorls but
disturbances of this arrangement by abortion occur. *Stamens* with short filaments and clavate anthers with peltate prolongation of connective. *Carpels* free with 1–2 almost orthotropous ovules with two integuments. *Fruit* a caryopsis. *Endosperm* scanty.

*Platanus.*

**Fam. 4. Rosaceae.** Herbs, shrubs or trees. *Leaves* spiral. *Stipules* sometimes adnate to petiole, rarely absent. *Flowers* cyclic, usually heterochlamydeous, actinomorphic, rarely zygomorphic. *Flower-axis* flat, dish- or cup-shaped: sometimes convex in the middle. *Sepals, petals* and *stamens* on the edge of the axis, perigynous or epigynous. *Petals* often orbicular and concave. *Stamens* mostly 2–4 times as many as sepals, or \( \infty \), rarely 1–5, bent inwards in bud. *Carpels* as many as sepals or 2–3 times as many or \( \infty \), rarely 1–4, free or united with the inner wall of the flower-axis, 1-locular with usually two anatropous ovules. *Styles* apical or on ventral side of carpels. *Fruit* follicular or indehiscent, or drupaceous or a false fruit by union of carpels with flower-axis. *Endosperm* scanty or absent. *Cotyledons* mostly fleshy, plano-convex.

Subfamily *Spiraeoideae.* *Filaments* narrowed upwards from broad base. *Carpels* 12–1 whorled, rarely sunk into flower-axis or on gynophore. *Ovules* \( \infty –2 \). *Fruit* usually of follicles.


*Spiraea*.

† The plants often known in Britain as *S. Ulmaria* and *S. Filipendula* belong more properly to the genus *Ulmaria*, subfamily *Rosoideae*, tribe *Ulmariæae.*
Rosaceae

Subfamily *Pomoideae*. *Stipules* distinct. *Carpels* 5–2, united with the inner wall of the hollow flower-axis, usually syncarpous (i.e. united to each other). *False fruit* formed of carpels + axis + lower part of calyx.

A. Carpels free on their ventral sides (i.e. the sides to which the styles are attached).
   Fruit a drupe with 3–5 partially exserted stones.  
   **Cotoneaster.**

B. Carpels united.
   Inner wall of carpel cartilaginous when ripe.  
   **Pirus.**
   Inner wall of ripe carpel hard, fruit hence a drupe.
   Leaves lobed. Flowers in corymbose cymes.
   **Crataegus.**

   Leaves undivided. Flowers solitary.  
   **Mespilus.**

Subfamily *Rosoideae*. *Carpels* either ∞, on conical gynophore, rarely few not enclosed in axis, or 1–∞ enclosed in persistent flower-axis: each carpel with 1–2 ovules. *Fruit* always indehiscent.


No epicalyx. Carpels each with two ovules. Fruit drupaceous.  
   **Rubus.**

Epicalyx present. Carpels with one ovule. Fruit dry, indehiscent. Style not persistent. Achenes on large fleshy receptacle.  
   **Fragaria.**

As *Fragaria* but achenes on small dry receptacle.  
   **Potentilla.**

Epicalyx. Fruit indehiscent with persistent style.  
   **Dryas.**
Leaves pinnate. Flowers several. Petals 5. Geum.

Tribe 2. Ulmarieae. Flower-axis flat or slightly concave. Filaments narrow at base, soon falling.
Only genus: Ulmaria.

Tribe 3. Sanguisorbeae. Flower-axis pitcher-shaped, enclosing and usually hardening around two or more achenes.
Epicalyx of four leaves. No petals. Styles basal or ventral. Alchemilla.
Epicalyx and petals both absent. Poterium.

Only genus: Rosa.


Fam. 5. Leguminosae. Herbs, shrubs or trees. Leaves of spiral stipulate, often compound. Flowers usually in racemes, cyclic, heterochlamydeous, 5-merous, hypogynous, usually hermaphrodite and zygomorphic. Stamens usually 10, 9 or all often united. Carpel mostly solitary with usually ∞ ovules on the ventral suture which is directed backwards. Style terminal. Fruit a pod or lomentum. Endosperm scanty or absent.

Subfamily Papilionatae. Roots in symbiosis with Bacillus radicicola. Flowers zygomorphic. Corolla with descending imbrication in bud.
   Shrubs. Mature leaves spinescent or scaly. *Calyx* deeply 2-lipped, coloured. *Ulex.*
   Shrubs. Leaves 1–3-foliate or absent. *Calyx* with two short minutely toothed lips. *Cytisus.*

   A. All ten stamens united. Keel beaked. *Ononis.*
   B. Upper stamen separate. Keel obtuse.
   a. Corolla deciduous, claws of petals free.
   I. Flowers in heads, umbels, or short racemes.
   Pod straight or curved, mostly linear, often beaked. *Trigonella.*
   Pod usually spiral, sometimes broadly oval and bent. *Medicago.*

II. Flowers in long racemes. Pods obovoid.
   *Melilotus.*
   b. Corolla usually persistent, claws of all or of four lower petals united to the staminal tube. *Trifolium.*

Pod enclosed by the calyx. **Anthyllis.**
Pod long, exserted. **Lotus.**

**Tribe 4. Astragaleae.** Herbs. **Leaves** pinnate: leaflets entire. **Upper stamen** usually free. **Pod** 2-valved with longitudinal septum derived from suture.
Keel obtuse. Pod-septum from dorsal suture. **Astragalus.**
Keel beaked or tip incurved. Pod-septum from ventral suture. **Oxytropis.**

**Tribe 5. Hedysareae.** **Upper stamen** usually separate. **Fruit** indehiscent, either a lomentum of several 1-seeded joints or consisting of only one such joint.
Keel obliquely truncate. **Fruit** 1–2-seeded, not jointed. **©Onobrychis.**
Keel beaked. **Fruit** jointed, curved, laterally compressed. **Hippocrepis.**
Keel obtuse. **Fruit** terete, many-jointed. **Ornithopus.**
Keel beaked. **Fruit** terete or 4-angled, jointed. **Coronilla.**

**Tribe 6. Vicieae.** Mostly herbs. **Leaves** pinnate with no terminal leaflet but instead a tendril or point. **Cotyledons** thick.
**Style** filiform, hairy below or all round. **Vicia.**
**Style** flat, hairy above. **Lathyrus.**

8. **The flowers have predominantly 5 or 4 whorls. Apocarpy and Isomery still occur, but Syncarpy and Oligomer of the Gynaeicum preponderate. Pleiomery of Gynaecium rare.** (For γ see page 54.)

Order 14. **Geraniales.** Herbs (the British species). **Flowers** cyclic, heterochlamydeous, usually 5-merous.
Carpels (5–2) often separating from each other when ripe. Ovules usually 2–1, more rarely ∞, anatropous, pendulous, with ventral raphe and micropyle directed upwards, or, when more than one ovule is present, single ones sometimes occur with dorsal raphe and micropyle directed downwards.

Suborder 1. Geraniineae. Flowers heterochlamydeous, mostly actinomorphic. Usually obdiplostemonous (i.e. stamens twice as many as petals, and carpels when isomerous opposite petals). Haplostemony more rarely, or individual stamens may abort in zygomorphic flowers. Anthers opening by longitudinal slits. Carpels isomerous or oligomerous. Ovules with two integuments.

Fam. 1. Geraniaceae. Herbs with lobed or divided, often stipulate leaves. Flowers 5-merous, actinomorphic. No real disc present. Petals imbricate or convolute in bud. Stamens 10, sometimes only five fertile. Carpels usually 5, each with 1–2 ovules. Capsule splitting into five beaked mericarps. Seeds with endosperm.


Fertile stamens 10. Styles glabrous within, twisting in flat spiral after dehiscence. Geranium†.

Fertile stamens 5. Styles silky within, twisting in helicoid spiral after dehiscence. Erodium.

† The so-called Geraniums of cultivation belong to the South African genus Pelargonium, which differs from the other Geranieae in having a sepaline spur which is adnate to the pedicel and best seen in section. The flowers are slightly zygomorphic. The fruit resembles that of Erodium.

Only British genus: Oxalis.


Fam. 4. Polypalaceae. Herbs or shrubs. Leaves usually simple, entire, exstipulate. Flowers 5-merous, zygomorphic. Sepals 5, of which two are petaloid and wing-like. Petals by abortion only 3. Stamens 8. Carpels with one rarely with 2–4 ovules. Fruit a capsule or drupe.

Only British genus: Polygala.

Suborder 3. Tricoceae. Flowers actinomorphic, diclinous, often very reduced. Carpels usually (3). Seed mostly with caruncle.

Fam. 5. Euphorbiaceae. Herbs, shrubs or trees, often with latex. Leaves usually spiral, often stipulate. Inflorescence mostly compound. Stamens as many as
Euphorbiaceae, Callitrichaceae

Sepals or twice as many or \( \infty \) or 1. Carpels usually (3). Fruit usually a capsule splitting into three mericarps. Endosperm copious.

Subfamily Crotonoideae. Each carpel with one ovule.

Tribe 1. Acalypheae. Latex absent. Calyx valvate. Flowers racemose. \( \delta \) usually without corolla.

Only British genus: **Mercurialis.**

Tribe 2. Euphorbieae. Latex present. Flowers in cyathia\( \dagger \). \( \delta \) without corolla and usually without calyx, and with only one stamen.

Only British genus: **Euphorbia.**

Suborder 4. CALLITRICHINEAE. Characters of the family. (Systematic position doubtful. Possible affinities with Verbenaceae.)

Fam. 6. CALLITRICHACEAE. Slender glabrous herbs, often submerged. Leaves opposite entire, upper often rosulate and floating. Flowers monoecious, naked, often with two falcate bracteoles. \( \delta \) of one terminal stamen. \( \varphi \) of two transverse carpels. A longitudinal septum makes ovary 4-loc. Fruit of four drupaceous mericarps. Seeds with endosperm.

Only genus: **Callitriche.**

Order 15. **Sapindales.** Mostly woody plants. (Impatiens is the only British herbaceous genus.) Characters of Geraniales but ovules in the reverse position, either pendulous with dorsal raphe and micropyle directed upwards, or ascending with ventral raphe and micropyle directed downwards.

\( \dagger \) A Cyathium is a condensed cymose inflorescence resembling a single flower.


Only British genus (leaves opposite): Buxus.

Suborder 2. Empetrineae. Flowers heterochlamydous. Each carpel with one ascending ovule with one integument. Carpels not separating when ripe.


Only British genus (leaves spiral, stamens 3): Empetrum.

Suborder 3. Celastrineae. Flowers heterochlamydous, always actinomorphic, diplostemonous or haplostemonous. Gynaecium tending towards oligomery, rarely isomerous.

Fam. 3. Aquifoliaceae. Trees with spiral, mostly evergreen, simple leaves. Flowers 4–5-merous, dioecious, actinomorphic. Disc absent. Petals often connate at base and adnate to the isomerous stamens. Carpels (4–6) each with 1–2 pendulous ovules with one integument. Fruit a drupe.

Only British genus (petals connate at base): Ilex.

Fam. 4. Celastraceae. Trees or shrubs with simple opposite or spiral leaves. Stipules absent or c.

Only British genus (leaves opposite, carpels isomerous): Euonymus.


Capsule inflated.

*Staphylea.

Suborder 4. Sapindineae. Flowers heterochlamydeous, typically diplostemonous but some stamens and carpels abort, actinomorphic or obliquely zygomorphic. Ovules with two integuments.


Only British genus (fruit wings lateral): Acer.


Only British genus (calyx tube long): *Aesculus.

Suborder 5. Balsaminineae. Flowers heterochlamydeous, zygomorphic, haplostemonous, with united anthers.
Balsaminaceae, Rhamnaceae


Only British genus (capsule opening elastically):

**Impatiens.**

Order 16. **Rhamnales.** *Flowers* cyclic, diplo-chlamydeous, sometimes appendageless. *Stamens* in one whorl opposite the petals. *Carpels* (5–2) each with 1–2 ascending ovules, with dorsal, lateral or ventral raphe and two integuments.


Tribe **Rhamneae.** *Serial buds* not present (as in *Colletia*). *Ovary* superior or inferior.

Only British genus (disc lining the calyx tube):

**Rhamnus.**

Order 17. **Malvales.** *Flowers* cyclic (*androccium* not always so), heterochlamydeous, hermaphrodite, rarely 5–2
zygomorphic. *Calyx* and *corolla* usually 5-merous, *sepals* mostly valvate in bud. *Stamens* ∞ or in two whorls, the inner of which is branched. *Carpels* (2–∞) each with 1–∞ anatropous ovules with two integuments.

Suborder **MALVINEAE.** *Sepals* mostly valvate: mucilage present.


Only British genus (wing-like bract adnate to peduncle): **Tilia.**


**Tribe Malveae.** *Style-arms* as many as carpels. *Fruit* a schizocarp.

*Epicalyx* of 3–6 connate segments. *Axis* longer than fruits. **Lavatera.**

*Epicalyx* of 6–9 connate segments. *Axis* shorter than fruits. **Althaea.**

*Epicalyx* of 3 distinct segments. **Malva.**
Guttiferae

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6. Flowers spirocyclic or of 5–4 whorls. Syncarpy the rule (Apocarpy in the more primitive, exotic families). Tendency for gynaeicum to become sunk in flower-axis. (For 8 see page 61, for 9 see page 71.)

Order 18. Parietales. Flowers spirocyclic or cyclic often with indefinite number of stamens and carpels, heterochlamydeous, rarely apopetalous, hypogynous or epigynous. Carpels more or less united often with parietal placentae, which, however, may meet in the middle. Ovules very seldom basal.

The suborders of Parietales may stand in phylogenetic relationship to some of the earlier orders, particularly Ranales and Rhoeadales. Suborder Flacouriineae (see page 71) shows possible affinities with Cucurbitaceae. Yet the Cucurbitaceae possess so many important peculiarities that they cannot have been derived directly from the Flacouriineae.

Suborder 1. Theineae†. Stamens often ∞. Gynaeicum free, on convex or flat flower-axis. Placentation often axile. Endosperm containing oil and proteid grains.

Fam. 1. Guttiferae. Trees or shrubs, more rarely herbs (most British species are herbaceous). Leaves opposite, entire, usually exstipulate, often with pellucid glands. K and C often 5, sepals imbricate. Stamens often ∞ and united in bundles. Carpels (3–5) with ∞–1 ovules with two integuments. Placentation parietal or axile. Seeds without endosperm.

Subfamily Hypericoideae. Stamens ∞ in 2–5 bundles. Styles usually free. Fruit a capsule, berry or drupe.


Only British genus (petals 5, unequal-sided):

Hypericum.

† Cf. Guttiferales of Bentham and Hooker.
Suborder 2. **Tamaricineae**. *Stamens* in whorls or if $\infty$ in bundles. *Gynaecium* free on flat flower-axis. *Endosperm* starchy or absent.

**Fam. 2. Elatinaceae.** Usually small plants growing in wet places and rooting at the nodes. *Leaves* opposite or whorled, stipulate. *Flowers* small, cyclic, 2–5-merous. *Sepals* and *petals* each 2–5, imbricate. *Stamens* in one or two whorls. *Ovary* 2–5-loc with $\infty$ axile ovules with two integuments. *Styles* as many as loculi, free. *Capsule* septicidal.

Only British genus (leaves spathulate): **Elatine**.


Only British genus (petals 5, usually with appendages): **Frankenia**.

*Fam. 4. Tamaricaceae.** Herbs or shrubs with minute alternate, entire leaves. *Flowers* mostly 4–5-merous. *Stamens* as many as petals or twice as many or $\infty$ in groups. *Carpels* (5–2). *Ovary* usually 1-loc with $\infty$ basal or parietal ovules. *Fruit* a capsule. *Seeds* hairy.

Tribe **Tamariceae**. *Flowers* racemose. *Seeds* with apical tuft of hairs.

Only British genus (stamens free): **Tamarix**.

Suborder 3. **Cistineae.** *Stamens* $\infty$, not in bundles. *Gynaecium* free on flat or convex axis. *Endosperm* with starch.
Fam. 5. CISTACEAE. Herbs and shrubs. Leaves mostly opposite. Stellate and glandular hairs, the latter with essential oils, often present. K 5–3. C 5–3 or 0. A ∞. G (5–10). Ovary usually 1-celled with parietal placentae with ∞ or 2 more or less orthotropous ovules. Capsule dehiscing between placentae. Seeds with endosperm. Only British genus (ovules ∞, capsule 3-valved): Helianthemum.

Suborder 4. FLACOURTIINEAE. Stamens often 5. Gynaecium free on convex or tubular axis, rarely adnate to axis. Endosperm copious containing oil and proteid bodies.

Fam. 6. VIOLACEAE. Herbs or shrubs with alternate stipulate leaves. Flowers 5-merous (except gynaecium), actinomorphic or zygomorphic. Petals sometimes united. Stamens 5. Carpels (3) each with 1–∞ anatropous ovules with two integuments on parietal placentae. Fruit a loculicidal capsule or berry.

Tribe Violeae. Corolla zygomorphic, two anterior stamens spurred.

Only British genus (flowers solitary in the leaf axils): Viola.

ξ. The flowers are cyclic and the sinking of the gynaecium into the hollow flower-axis is general: connation of gynaecium and flower-axis predominates. (For ξ see page 69.)

Order 19. MYRTIFLORAE. Herbs, shrubs, or trees, bundles often bicollateral. Flowers cyclic, heterochlamydeous, rarely apopetalous, haplo- or diplostemonous, usually actinomorphic. Flower-axis concave. Gynaecium syncarpous and mostly united to axis.

Suborder 1. THYMELAEINEAE. Usually shrubs with entire leaves. Flower-axis more or less tubular
Thymelaeaceae, Lythraceae

(except in ♂ Elaeagnaceae). *Gynaecium* of 2–4 carpels, free from the flower-axis.

Fam. 1. **Thymelaeaceae**. Shrubs or trees with acrid juice and tenacious, reticulate bast. *Leaves* entire, alternate or opposite, exstipulate. *Flowers* hermaphrodite, heterochlamydeous or apopetalous, diplostemonous, 5–4-merous. *G* usually 1 with one pendulous ovule. *Style* 1, terminal or lateral. *Fruit* often a drupe.

Subfamily *Thymelaeoideae*. *Flowers* diplostemonous or haplostemonous. *Petals* scale-like or absent. *Carpel* 1 with one ovule.

Only British genus (filaments and style very short): *Daphne*.

Fam. 2. **Elaeagnaceae**. Shrubs or trees with silvery or brown scales. *Flower-axis* in ♂ flowers flat, in ♀ and ♂ flowers tubular. *Flowers* mostly 4-merous, homochlamydeous. *Androecium* diplostemonous in ♂ flowers; in ♀ haplostemonous and with stamens opposite perianth lobes. *Carpel* 1 with one basal ovule. *Fruit* a nut enclosed in the fleshy axis.

Only British genus (sepals 2, stamens 4): *Hippophae*.

Suborder 2. **Myrtineae**. Herbs or shrubs. *Leaves* more often opposite. *Flowers* with tubular axis and 2–∞ carpels forming syncarpous gynaecium which is usually united to axis. *Ovules* with one integument.

Fam. 3. **Lythraceae**. Herbs or shrubs. *Leaves* opposite or whorled, entire. *Flowers* heterochlamydeous or apopetalous, usually 4–6-merous, hermaphrodite, actinomorphic or zygomorphic. *Flower-axis* cup-shaped or tubular. *Calyx* valvate with intersepalar stipules. *Petals* on edge of flower-axis, sometimes absent. *Stamens*
twice as many as sepals or 1–∞, inserted deeper than the petals. Carpels (2–6) each with ∞–2 ovules, free from the flower-axis. Ovary 2–6-loc, ovules ∞, axile. Style 1 with capitate stigma. Fruit a capsule. Seeds without endosperm.

Tribe Lythreae. Septa of ovary imperfect upwards.


Tribe Oenothereae. Ovary quite inferior.
Fam. 5. Halorrhagaceae. Herbs of very diverse habit. *Flowers* small, heterochlamydeous, or often apopetalous. *Stamens* twice as many as *sepals* or fewer. *Anthers* long, 4-angled. *Carpels* usually (4) united to the tubular axis, each with one pendulous ovule. *Styles* separate. *Fruit* a nut or drupe. *Seeds* with endosperm.

Subfamily 1. Halorrhagoideae. *Petals* 2–4 or 0. *Carpels* (2–4) each with one ovule.


Stamen 1. One *carpel* with one ovule without integument.


Only genus (stems simple, erect): Hippuris.


usually with one ovule. *Micropyle* facing outwards. *Fruit* a berry or drupe.


Only British genus (leaves simple, endosperm lobulate):

**Hedera.**

**Fam. 2. Umbelliferae.** Herbs with hollow internodes. *Leaves* alternate with conspicuous *sheath*, and usually compound *lamina*. *Flowers* in simple or compound umbels, 5-merous, haplostemonous. *Calyx* usually inconspicuous. *Petals* epigynous, tips often inflexed. *Stamens* at base of stylopodium. *Anthers* versatile. *G* (2), median. *Styles* 2 arising from epiygnous disc (*stylopodium*). *Fruit* separating into two *mericarps* pendulous on the *carpophore*, each *mericarp* with five *primary ridges*, i.e. two lateral next to the commissure and three dorsal. Four *secondary ridges* are sometimes present between the primary. *Oil canals* (*vittae*) occur in the grooves between the *primary ridges*: two or more are present on the commissural face of the mericarp. *Seed* adherent to pericarp. *Endosperm* copious. *Embryo* minute.


Tribe 1. *Hydrocotyleae*. *Fruit* laterally compressed. (*Commissure* narrow.)

Only British genus: **Hydrocotyle.**


A. *Haplozygíaeae*. Primary ridges more conspicuous than the secondary. Vittae usually obvious in the furrows.

a. *Seed* furrowed ventrally by the raphe.


Subtribe 1. *Scandícinæae*. Fruit long-cylindrical and beaked, smooth or with short spines.

i. Vittae several in each furrow. *Conopodíum.*

ii. Vittae 1 in each furrow, or absent.

Fruit smooth, over 2 cm. long, with prominent obtuse ridges and long beak. *Scandíx.*
Fruit slightly rough, over 2 cm. long. Ridges very acute. Carpophore split to middle. 
Myrrhis.

Fruit rather rough, 5 mm. long. Ridges vanishing upwards. Carpophore undivided or shortly bifid. 
Chaerophyllum.

Fruit smooth, under 1 cm. long. Beak short, ribbed. 
Anthriscus.

Subtribe 2. Caucaulinae. Fruit ovoid, secondary ridges spinous.
Only British genus: Caucaulis (including Torilis).


*Coriandrum.

One vitta in each furrow; ridges entire, slender.
Physospermum.
Several vittae in each furrow. Stylopodium flattened.
Ridges crenate.
Several vittae in each furrow. Stylopodium conical.
Ridges obscure.
Ph. Seed flat ventrally. Raphe often projecting towards carpophore.

Tribe 6. Amminae. Dorsal and commissural primary ridges all alike. Seed semicircular in section.

1. Petals entire, with acute or inflexed tips. Vittae 1–3 in each furrow.
Leaves simple, entire. Flowers yellow. *Bupleurum.*
Leaves compound. Flowers white, dioecious. ♂ flowers with narrower petals. *Trinia.*
Leaves compound. Flowers white, hermaphrodite. *Apium.*


   Calyx teeth minute or absent. Vittae as long as fruit. *Carum.*
   Calyx teeth minute or absent. Vittae only in upper half of fruit. *Sison.*
   Calyx teeth leafy, ovate, acute. Vittae long. *Cicuta.*

3. Petals as 1, but vittae usually several in each furrow.
   Calyx teeth absent. Vittae many. *Pimpinella.*

Subtribe 2. *Seselinae.* Ridges prominent, sometimes winged, lateral ones forming continuation of commissural face of fruit.

1. Fruit almost cylindrical. Ridges not thickened or corky.
   Calyx teeth minute. Petals white, notched. *Seseli.*
   Calyx teeth 0. Petals yellow, entire. *Foeniculum.*

2. Fruit as above. Primary ridges acute; outer coat of pericarp loose, corky. *Crithmum.*

3. Fruit as above. Primary ridges thick, lateral ridges forming a corky rim round the carpel.
Bracteoles short, whorled. Oenanthe.
Bracteoles long, unilateral. Aethusa.

4. Fruit as above, lateral ridges thickened or winged. Silaus.

5. Fruit dorsally compressed. Primary ridges broad, thick.
   Seed grooved ventrally, vittae several. Meum.
   Seed flat or slightly concave ventrally, vittae many or obscure. Ligusticum.
   Seed biconvex: one vitta in each of the dorsal furrows. Selinum.

Tribe 7. Peucedaneae. Lateral ridges winged, much broader than the three dorsal ridges which are often only feebly developed. Seed narrow in section.

Subtribe 1. Angelicinae. Lateral ridges of opposite carpels not appressed but gaping.
   Only British genus:
   Angelica (including *Archangelica).

Subtribe 2. Ferulinae. Lateral ridges appressed, forming a wing round the fruit.
   Only British genus: Peucedanum.

Subtribe 3. Tordyliinae. As Ferulinae but wing hardened.
   Vittae slender. Margins of wing thick. Tordylium.

B. Diplozygieae. Secondary ridges as large as or larger than the primary.

Fam. 3. **Cornaceae.** Trees or shrubs. Leaves opposite or spiral, usually entire, exstipulate. Flowers small, in cymes, umbels, or heads, 4–5-merous, mostly haplostemonous. Carpels (4–1) with an epigynous disc, each carpel with one ovule. Micropyle facing outwards or inwards. Style i. Fruit a drupe or berry.

Subfamily **Cornoideae.** Ovary inferior. Raphe dorsal.

Only British genus (leaves opposite. Petals 4, valvate): Cornus.

Subclass 2. **Metachlamydeae** (Sympetralae). Perianth in advanced stage of development, always originally double, and the inner whorl gamopetalous. Polypetalous forms occur but they are closely related to gamopetalous forms.

A. Polypetalaly, as well as sympetaly, occurs. Two whorls or one whorl of stamens. Hypogyny predominates, but epigyny also occurs. (For B see page 85.)

Order i. **Ericales.** Shrubs and herbs, rarely trees, with simple leaves. Flowers 4–5-merous, obdiplostemonous, or the antipetalous whorl of stamens not developed. Petals free or united. Stamens hypogynous or epigynous, more rarely united at base with the petals. Carpels (2–∞), when isomerous opposite petals. Ovary superior or inferior. Ovules with one integument.

Fam. i. **Pirolaceae.** Evergreen or colourless perennial herbs with spiral leaves. Flowers solitary or racemose, 5–4-merous, obdiplostemonous. Petals free or united. Stamens hypogynous. Carpels (5–4) each with ∞ minute ovules on fleshy placentae. Capsule
loculicidal. *Seeds* with loose *testa* and fleshy *endosperm*. *Embryo* of few cells without cotyledons.


Only British genus (herbs with broad evergreen leaves): *Pirola* (including *Moneses*).


Tribe *Monotropeae*. *Ovary* 4–5-loc below, 1-loc above.

Only British genus (colourless root-parasites): *Monotropa*.


c.
(Petals 5, spreading.) *Ledum.


B. Berry, drupe or loculicidal capsule. Petals united, deciduous. Anthers appendaged or prolonged into tubes.


Only British genus (Corolla pitcher-shaped): *Andromeda.


Only British genus (Filaments straight, Fruit a berry): *Vaccinium (including *Oxycoccos).

Subfamily 4. Ericoideae.


Order 2. Primulales. Flowers 5 (rarely 4–8)-merous, usually actinomorphic. Corolla nearly always gamopetalous. Stamens in one whorl, inserted on corolla opposite the lobes (antipetalous). Ovary 1-loc with ∞−1 ovules which have two integuments on free central or basal placenta.

Fam. PRIMULACEAE. Mostly perennial herbs. Leaves usually spiral, exstipulate. Stamens opposite corolla lobes. Ovary usually superior with ∞ whorled or spirally arranged ovules on a free central placenta. Style 1. Capsule with usually many-angled and facetted seeds sunk in cavities on the placenta.

Tribe 1. Androsaceae. Corolla imbricate or quin-cuncial in bud, lobes eventually erect or spreading, never reflexed (in British genera).


Only genus (Leaves all submerged, pinnately divided): **Hottonia.**

*Tribe 2. **Cyclamineae.** Rootstock often tuberous. Corolla lobes reflexed.
Only British genus (Scapes 1-flowered): *Cyclamen.*


Subtribe 1. **Lysimachiinae.** Capsule with valves.
Leaves subrosulate towards top of scape. Corolla white, lobes 5–9.
Leaves spiral, opposite or whorled. Corolla yellow, lobes 5.

Subtribe 2. **Anagallidinae.** Capsule opening by lid. Corolla absent. Calyx campanulate, coloured. **Glaux.**
Corolla shorter than calyx. Filaments glabrous. **Centunculus.**
Corolla longer than calyx. Filaments villous. **Anagallis.**

Tribe 4. **Samoleae.** Corolla quincuncial in bud. **Ovary** half inferior.
Only genus (Bracts displaced on to the pedicels): **Samolus.**

Order 3. **Plumbaginales.** Corolla polypetalous or gamopetalous. **Stamens** in one whorl opposite the petals. **Gynaeicum** (5). Styles 5 or style 5-fid. **Ovary** 1-loc with one basal anatropous ovule with long funicle and two integuments. (Perhaps connected with Centro-spermae.)

Tribe Staticeae. Inflorescence compounded of cincinni. Stamens united to the corolla. Styles united only at base.

Cymes very dense. Styles hairy. Armeria.

B. Sympetaly dominant. Stamens always in one whorl. Union of Carpels sometimes imperfect. Hypogyny usual. (For A see p. 80, for C see p. 87.)

Order 4. Contortae. Shrubs and herbs, rarely trees. Leaves usually opposite, entire and exstipulate. Flowers mostly 5-merous, more rarely 2–6-merous, mostly sympetalous. Corolla usually twisted in bud. Stamens usually isomerous (two in Oleaceae) and inserted on the corolla, rarely hypogynous. Carpels 2, sometimes free below.


Fam. 1. Oleaceae. Woody plants, sometimes climbing, rarely herbs. Leaves opposite or whorled, simple or pinnate. Flowers racemose or cymose, 2–6-merous, mostly sympetalous, more rarely with free petals or apopetalous, hermaphrodite or diclinous. Corolla 4, 5, or 6, free or united. Stamens 2, filaments short. Carpels (2), each carpel with usually two anatropous ovules. Fruit a capsule, berry or drupe.
Subfamily Oleoideae. Ovules pendulous from apex of loculi.

Tribe 1. Fraxineae. Petals free or united only at base, sometimes absent. Fruit winged.
Only British genus (Fruit-wing distally produced): Fraxinus.

*Syringa.

Tribe 3. Oleeeae. Petals 4, free or united. Fruit a berry or drupe, mostly 1-seeded.
Only British genus: Ligustrum.

Suborder 2. GENTIANINEAE. Stamens as many as petals. Ovary superior, 1–2-loc with ∞ ovules which have one integument on parietal or axile placentae.

Fam. 2. GENTIANACEAE. Annual or perennial, usually glabrous, bitter herbs, rarely shrubs. Leaves opposite, entire, exstipulate. Flowers cymose, usually 4–5-merous, sympetalous, hermaphrodite, actinomorphic. Sepals free or united. Corolla mostly twisted in bud. Stamens as many as petals, inserted on the corolla. Carpels (2) with usually ∞ ovules. Ovary mostly 1-loc with parietal placentae. Fruit a 2-valved capsule.


Microcala.


Cicendia.


Centaurion.


Only British genus (Corolla subclavate): Gentiana.


Menyanthes.


Fam. 3. Apocynaceae. Shrubs or trees, rarely entirely herbaceous, often climbing. Latex present. Leaves opposite, quite entire. Corolla usually twisted in bud. Stamens 4–5, anthers basifixed. Carpels usually 2, free below. Styles united, ending in discoid or globose head which bears the stigmas. Fruit various.

Subfamily Plumerioideae. Stamens quite free or loosely attached to stigmatiferous head. Thecae mostly without appendages. Seeds usually without tuft of hairs.

Tribe Plumerieae. Carpels 2, free below the style.

Only British genus (disc of 2 scales, filaments clavate): Vinca.

C. Sympetaly constant. Only one whorl of stamens present. Carpels usually 2, always perfectly united. Zygomorphy frequent. (For B see page 85.)

a. Perianth hypogynous. (For b see page 98.)
Order 5. **Tubiflorae.** Mostly herbs. Flowers typically with four isomerous whorls, but the gynaecium usually shows reduction. When zygomorphic the androecium too shows reduction. Stamens epipetalous. Ovules with one integument.

Suborder 1. **CONVOLVULINEAE.** Leaves mostly spiral. Flowers usually actinomorphic. Carpels with few, often only two, ovules, micropile facing downwards. Fruit seldom separating into nutlets (never in British genera).

Fam. 1. **CONVOLVULACEAE.** Often left-handed twiners. Flowers often conspicuous, 5-4-merous. Corolla mostly induplicate valvate in bud. Stamens inserted at base of corolla-tube. Carpels (2), each with two basal erect ovules. Styles separate or united. Fruit usually capsular.

Subfamily 1. **Convolvuloideae.** Autotrophic, with green foliage leaves. Corolla without scales.

Tribe Convolvuleae. Style 1. Capsule dehiscent, 4-seeded.


Bracteoles large, enclosing calyx. Stigma broad.

*Calystegia.*

Subfamily 2. **Cuscutoideae.** Leafless parasites. Corolla usually with ring of scales beneath the stamens.

Only genus: *Cuscuta.*

Fam. 2. **POLEMONIACEAE.** Herbs, rarely shrubs. Leaves spiral, exstipulate, sometimes pinnate. Flowers 5-merous, usually actinomorphic. Corolla usually twisted to right in bud. Carpels (3), each with usually ∞ ovules. Style 1, trifid. Capsule mostly loculicidal.
Subfamily *Polemonioideae*. Herbs. *Embryo* green, with ovate or linear cotyledons.


Suborder 2. **BORRAGININEAE.** As *Convolvulineae*, but *micropile* facing upwards. *Fruit* often separating into nutlets.

Fam. 3. **BORRAGINACEAE.** Mostly hispid herbs. *Leaves* alternate, undivided. *Flowers* in cincinni, 5-merous, mostly zygomorphic. *Corolla* often with *hollow folds* opposite the lobes. *Stamens* with short *filaments* and often subulate *anthers*. *Carpels* (2), each with two anatropous *ovules*. *Ovary* usually 4-loc by false septa, 4-lobed. *Style* 1, arising from between the lobes. *Stigma* simple or bifid. *Fruit* usually dividing into four nutlets.

Subfamily **Borraginoideae**. *Ovary* deeply lobed. *Fruit* of four or fewer 1-seeded nutlets. *Endosperm* absent.

Tribe 1. **Cynoglosseae.** *Nutlets* inserted by broad ventral surfaces on to conical axis, their tips not projecting beyond point of attachment.

Corolla rotate. *Nutlets* glabrous with inrolled borders. **Omphalodes**.

Corolla funnel-shaped. *Nutlets* with hooked bristles. **Cynoglossum**.

Borraginaceae

Calyx with alternating teeth. Nutlets tubercled.  

\*Asperugo.

Calyx without alternating teeth. Nutlets with bristly rim.  

\*Lappula.

Tribe 3. Anchuseae. Axis nearly flat. Nutlets with concave surface of insertion which is often surrounded by a ring.

a. Corolla with hollow scales.

Corolla tubular, 5-toothed, hollow scales linear, anthers included, without appendages.  

\*Symphytum.

Corolla rotate, hollow scales short. Filaments with dorsal appendages. Anthers exserted, conniving to form a cone.  

\*Borrago.

Corolla salver-shaped, hollow scales short. Stamens included, with no appendages.

Anchusa (including Lycopsis).

b. Corolla without hollow scales.  

\*Pulmonaria.


\*Lithospermum.


Mertensia.


\*Myosotis.


Only genus (Calyx regular):  

\*Echium.

Suborder 3. Verbenineae. Leaves mostly opposite or whorled. Flowers mostly zygomorphic. Each carpel
Verbenaceae, Labiatae

with two ovules, rarely with only one. Fruit often of nutlets.


Tribe Verbeneae. Mostly herbs. Flowers in spikes or racemes. Loculi of ovary divided or not. No endosperm.

Only British genus: Verbena.

Fam. 5. Labiatae. Aromatic herbs and shrubs. Leaves and branches opposite or whorled. Flowers usually zygomorphic, in cymes often forming false whorls. K 5. C 5, limb often 2-lipped. A 4, didynamous, or two stamens and two staminodes, or two stamens and no staminodes, 5th stamen rarely represented by staminode. G (2), each with two erect anatropous ovules. The carpels are folded in between the ovules. Fruit dividing into four nutlets, or fewer by abortion.


Tribe 1. Ajugeae. Calyx 10-ribbed. Corolla either almost actinomorphic or (as in British genera) with very

Corolla persistent, with ring of hairs within. Upper lip 2-lobed. 

Corolla deciduous, without ring of hairs. Upper lip absent. 

Ajuga.


(Calyx-tube dilated above to form hollow pouch.)

Scutellaria.


Only British genus: Marrubium.


Only British genus: Nepeta.


B. Dehiscing anther-thecae vertical or oblique.

1. Nutlets sharply 3-angular with obtuse apex.


2. Nutlets ovoid with rounded apex.

Calyx funnel-shaped, teeth dilated at base or united to form a ring. Calyx tubular or campanulate, teeth 3-angular, not dilated or united. *Ballota*. *Stachys*.


Tribe 6. *Satureieae*. Calyx with five equal teeth or 2-lipped. *Corolla* with flat lobes, almost actinomorphic or 2-lipped. *Stamens* 4 or 2, equal or the anterior pair longer.
   Corolla-tube almost straight. Upper lip flat. Satureia (Calamintha auct.).


   Fertile stamens 4.
   Two anterior stamens alone fertile. Mentha.

Suborder 4. SOLANINEAE. Flowers actinomorphic, or more often zygomorphic, typically 5-merous. Stamens 5 or 4 or 2. Carpels rarely (5), mostly (2), usually with ∞ ovules. Fruit mostly capsular, never dehiscent quite to the base.

   a. Vascular bundles bicollateral. (For β see p. 95.)

Fam. 6. SOLANACEAE. Herbs or shrubs with spiral leaves. Flowers terminal, single and often supra-axillary, or in cymose, often supra-axillary, inflorescences, mostly 5-merous, hermaphrodite, actinomorphic, or rarely zygomorphic. Corolla-lobes mostly folded in bud. Stamens 5 (in zygomorphic flowers one may be staminal). Carpels (2), oblique. Ovules ∞ on the septum. Style 1. Fruit a berry or capsule. Seeds with endosperm.

Scrophulariaceae


Herbs or shrubs. Corolla rotate. Anthers conniving. Fruit a berry.

(Capsule with spines.)

*Datura.

β. Bundles collateral. (For α see p. 94.)

I. Ovary 2-locular, usually with ∞ axile ovules.
(For II see p. 97.)

Fam. 7. Scrophulariaceae. Herbs, shrubs or trees. Leaves spiral or opposite. Inflorescence various, flowers never terminal. Flowers 5-merous, hermaphrodite, more or less zygomorphic. Calyx usually persistent. Stamens rarely 5, mostly 4 or 2. G (2), median (not oblique), each with ∞—few anatropous ovules on the dissepiment. Style 1. Fruit a capsule or berry.

Subfamily 1. Pseudosolanoideae. Leaves mostly spiral. The two posterior (upper) corolla-lobes, or the upper lip, cover the lateral lobes in bud. Five fertile stamens present.


Verbascum.

Subfamily 2. Antirrhinoideae. Lower leaves at least opposite. Aestivation as in Pseudosolanoideae. Fifth (posterior) stamen staminodal or absent.

1. Corolla-tube saccate at base.  
   Antirrhinum.

2. Corolla-tube spurred at base.  
   Leaves narrow, pinnately veined. Flowers in terminal racemes. Capsule with valves.  
   Linaria.

   Leaves narrow, pinnately veined. Flowers solitary. Capsule with pores.  
   Elatinoides.

   Leaves cordate, digitately nerved and lobed. Capsule with small trifid valves.  
   *Cymbalaria.

   Only British genus:  
   Scrophularia.

   Leaves opposite. Flowers large. Stigma 2-lamellate.  
   *Mimulus.

   Leaves fascicled. Flowers minute. Stigma clavate.  
   Limosella.

Subfamily 3. Rhinantheae. The two posterior (upper) corolla-lobes or the upper lip are covered in bud by the lateral corolla-lobes.

   a. Corolla-lobes all nearly flat.

   Corolla-tube short. Stamens 4–8, equal.  
   Sibthoropia.

   Corolla-tube short. Stamens 2, equal.  
   Veronica.

Large herbs. Corolla-tube long, dilated. Stamens 4, didynamous.  
   Digitalis.

   *Eринus.
b. The two upper corolla-lobes form a helmet-shaped upper lip.


II. *Ovary* 1-locular with ∞ ovules on more or less parietal placentae. (For I see p. 95, for III see below.)

Subterranean leaves membranous or o. Flowers sub-spikate. Stamens included. *Orobanche*.

III. *Ovary* usually 1-celled with free central placent bearing ∞ ovules.

Fam. 9. *LENTIBULARIACEAE*. Herbs, mostly aquatic, or growing in wet places. Roots often absent. Leaves c.
radical or whorled, undivided or multifid. Flowers 5-merous, mostly zygomorphic. Corolla usually distinctly 2-lipped. Stamens usually 2. Carpels (2), median. Ovules many on the free central placenta. Fruit capsular.

Tribe Utricularieae. Corolla zygomorphic with distinct spur.


b. Perianth epigynous. (For a see p. 87.)

a. Stamens free. (For β see page 102.)
Order 7. Rubiales. Herbs, shrubs and trees. Leaves opposite, usually undivided. Flowers 5-4-merous, isomerous or androecium and gynaecium oligomerous, usually actinomorphic. Ovary inferior with one or several loculi, each with $\infty -1$ anatropous ovules.

A. Stamens as many as corolla-lobes. (For B see page 101.)

Fam. 1. Rubiaceae. Herbs, shrubs or trees, with opposite entire leaves. Stipules always present, interpetiolar (foliaceous in British species). Flowers 5-4-merous, usually actinomorphic. Sepals mostly valvate. Carpels mostly (2), more rarely (1-\infty), each carpel with 1-\infty anatropous ovules. Style 1, with capitate or divided stigma. Fruit various.

Subfamily Coffeoidae. Carpels each with one ovule.


A. Sepals distinct, more than half as long as ovary. Corolla funnel-shaped with long tube. Sherardia.

B. Sepals minute or absent.
   b. Corolla rotate.

Flowers often 5-merous. Fruit succulent. Rubia.
Flowers 4-merous. Fruit dry. Galium.

Fam. 2. Caprifoliaceae. Usually shrubs or small trees. Leaves opposite, usually exstipulate. Stipules when present (as in Sambucus) not interpetiolar. Flowers actinomorphic or zygomorphic. Carpels (2-5), each with
Adoxaceae

1–∞ axile, pendulous ovules. Style simple or divided. Fruit a berry or drupe, rarely a capsule.


Only British genus: Sambucus.


Only British genus: Viburnum.


Only British genus (Flowers zygomorphic): Lonicera.

Fam. 3. Adoxaceae. A small succulent herb. Leaves ternate. Flowers in 5-flowered heads, terminal 4, lateral 5-merous, homochlamydeous. Calyx (bracts and bracteoles) 2–3-lobed. Stamens 4 or 5–6, split to the base. Carpels (3–5), each with one pendulous ovule. Fruit a drupe with 1–3 stones. The position of this monotypic genus is very uncertain.

Only genus: Adoxa.
B. *Stamens* fewer than *corolla-lobes*. *Ovary* inferior always with only one fertile *loculus* with one pendulous *ovule*. (For A see page 99.)


**Tribe Valerianeae.** *Stamens* usually 3, more rarely 2 or 1.

Calyx obscurely 5-toothed. *Stamens* 3.

Valerianella.


Valeriana.

Calyx forming pappus. Corolla-tube spurred at base. Stamen 1.

*Kentranthus.*


Involucral-bracts very long, rigid. Floral-bracts spinous, longer than flowers.

Dipsacus.

Involucral-bracts short. Floral-bracts short or absent.

Scabiosa.
8. Stamens conniving or partly united. (For a see p. 98.)

Order 8. **Cucurbitales.** Mostly climbing herbs. *Flowers* typically 5-merous. *Stamens* 5, rarely all free, usually appearing as 3 by union of two pairs, or all 5 may be united into a *synandrium.*


**Tribe Cucurbiteae.** *Stamens* 5, mostly two pairs united and one free. *Anthers* with ∞-shaped or U-shaped *pollen-sacs.*

Only British genus: **Bryonia.**

Order 9. **Campanulatae.** Mostly herbs. *Flowers* typically 5-merous with isomerous *androecium* and oligomerous *gynaecium.* *Anthers* often united. *Ovary* inferior, with several loculi each with ∞-1 *ovules,* or 1-loc with one *ovule.*


As *Campanula*, but ovary and capsule slender.

*Specularia*.

Subtribe 2. *Wahlenbergiinae*. Ovary inferior or almost superior. *Fruit* usually a capsule dehiscing apically.

*Flowers* capitate. *Corolla-lobes* almost free. *Anthers united at base.*


*Jasione*.


Only British genus:

*Wahlenbergia*.

*Lobelia*.

**Fam. 2. COMPOSITAE.** Mostly herbs. *Leaves* spiral or opposite, exstipulate, sometimes with auricles. *Flowers* in involucrate *heads*. *Involucral-bracts* spiral or whorled, sometimes united, usually not bearing flowers in their axils. *Floral-bracts* chaffy, setaceous, petaloid, or absent. *Flowers* 5-merous, hermaphrodite, or ♀ and ♂ flowers
Compositae

separate, or sterile, actinomorphic or zygomorphic. *Calyx* rarely distinctly developed, usually represented by hairs, bristles or scales forming the *pappus*. *Corolla* tubular, ligulate, or 2-lipped (in Tribe *Mutisieae*, not represented in Britain). *Stamens* inserted on the *corolla-tube*, *filaments* usually free. *Anthers* usually united, forming a tube, dehiscing inwards. *Carpels* (2), median, but the *ovary* is 1-locular with one ascending, anatropous *ovule*. *Style* bifid in the fertile flowers, the two arms stigmatic on their inner surfaces. *Fruit* a 1-seeded, inferior nut. *Seeds* without endosperm.


Only British genus:  

**Eupatorium.**


**Solidago.**

Ray-flowers 1-seriate, white or pink: disc-flowers yellow. Pappus absent.  

**Bellis.**

Ray-flowers 1-seriate, white, blue or purple: disc-flowers yellow. Pappus many-seriate, persistent. **Aster.**

As *Aster*, but ray-flowers 2 or more seriate.  

**Erigeron.**
2. As 1 but floral-bracts absent.
Heads dioecious.

*Antennaria* (including *Anaphalis*).
Heads with $\delta$ and $\varphi$ flowers. *Gnaphalium.*
3. Corolla of $\varphi$ (ray) flowers ligulate. Floral-bracts absent.
   Pappus of scabrid hairs. *Inula.*
   Pappus of an inner row of scabrid hairs and an outer row of scales. *Pulicaria.*


Tribe 5. *Anthemideae*. As *Heliantheae* but often aromatic, *leaves* spiral, and *involucral-bracts* with broad scarious margins. *Pappus* minute or absent.
   *Anthemis.*
   Ray-flowers with short, broad ligule. Fruit much compressed. 
   *Achillea.*
   Ray-flowers absent. Corolla compressed, with corky appendages. 
   *Diotis.*

   *Matricaria.*
   Ray-flowers ligulate. Involucral-bracts many-seriate, outer shorter. 
   *Chrysanthemum.*
   Flowers all tubular, 4-merous. 
   *Cotula.*
   Flowers all tubular, 5-merous. Axis of head broad. 
   *Tanacetum.*
   Flowers all tubular, 5-merous. Axis of head narrow. 
   *Artemisia.*


* Leaves often very large, produced after the flowers. Style-arms of disc-flowers connate.
  Heads in racemes, purple or white, outer flowers tubular. 
  *Petasites.*
  Heads solitary, yellow, outer flowers ligulate. 
  *Tussilago.*

** Leaves radical and cauline. Style-arms of disc-flowers separate, truncate.
  Perennial herbs. Involucral-bracts in several series all equal. 
  *Doronicum.*
Annual and perennial herbs. Involucral-bracts 1-seriate or with a few smaller ones at the base.

**Senecio.**


(Fruit bent inwards.)

*Calendula.*

**Tribe 8. Cynareae. Leaves** spiral, often spinous. *Involucral-bracts* many-seriate, often spinous. *Axis of head* usually with *bristles* which have no definite relationship to the flowers. *Flowers* often purple, usually all tubular, all hermaphrodite, or outer ♀ or neuter. *Anthers* usually with tails at base. *Style* usually with ring of hairs or swelling.

Subtribe 1. *Echinopsinae.* Heads 1-flowered, themselves arranged in heads of the second order. *Flowers* blue or white.

*Echinops.*

Subtribe 2. *Carlininae.* Heads many-flowered. *Fruit* with straight insertion, usually covered with silky hairs. *Pappus* of scales or of 1-seriate, feathery hairs.

Only British genus: *Carlina.*


A. *Pappus* hairs simple.

Outer involucral-bracts hooked.

Outer involucral-bracts not hooked.

Filaments free, warded or hairy. *Pappus* hairs connate at base.

*Arctium.*

*Carduus.*
Filaments connate into a sheath. Pappus free.  

**Silybum.**

B. Pappus hairs all, or inner ones only, feathery.  
Involucral-bracts without spines. Filaments glabrous.  

**Saussurea.**

Involucral-bracts with spines. Filaments warty or hairy. Fruit compressed or terete.  

**Cnicus.**

Involucral-bracts with spines. Filaments nearly glabrous. Fruit 4-angled.  

**Onopordon.**

Subtribe 4. **Centaureinae.** Heads many-flowered. Fruit with oblique insertion, glabrous or hairy. Pappus many-seriate.  

Involucral-bracts without appendages. All flowers hermaphrodite.  

**Serratula.**

Involucral-bracts with scarious or thorny appendages. Outer flowers quite sterile and larger than inner ones.  

**Centaurea.**

Subfamily 2. **Liguliflorae.** Latex present. Corolla of all flowers ligulate.

Tribe 9. **Cichorieae.** Leaves spiral. Style-arms cylindrical, hairy, obtuse.

Subtribe 1. **Hyoseridinae.** Fruit obtuse. Pappus of scales. (Flowers blue in British species.)  

**Cichorium.**

Subtribe 2. **Lapsaninae.** Involucral-bracts almost equal. Fruit obtuse. Pappus absent. (Flowers yellow in British species.)  

Leaves all radical. Fruit crowned with ring.  

**Arnoseris.**

Leaves radical and cauline. Fruit without ring.  

**Lapsana.**

Pappus of feathery hairs.

Pappus of simple hairs.

| Picris. |
| Crepis. |

Subtribe 4. *Hieraciinae*. Stellate or woolly hairs often present on leaves. Fruit rounded at apex. Pappus rough, brown.

| Hieracium. |

Subtribe 5. *Hypochaeridinae*. Involucral-bracts all imbricate, the inner ones keeled after flowering. Fruit beaked. Pappus simple or feathery.

Narrow, membranous floral-bracts present. Beak of inner fruits long. Pappus hairs feathery. *Hypochaeris*.

No floral-bracts. All beaks short. Pappus hairs feathery. *Leontodon*.

No floral-bracts. All beaks long. Pappus hairs simple. *Taraxacum*.


Fruit not beaked, scarcely narrowed above. *Sonchus*.

Fruit narrowed or beaked above. *Lactuca*.

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