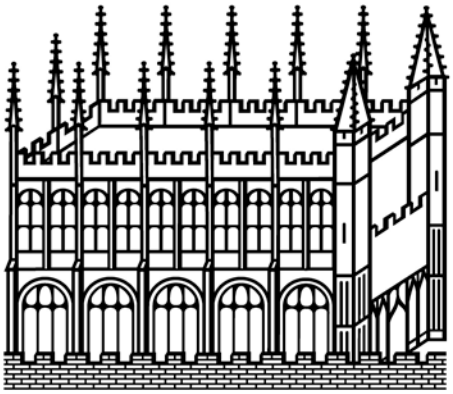

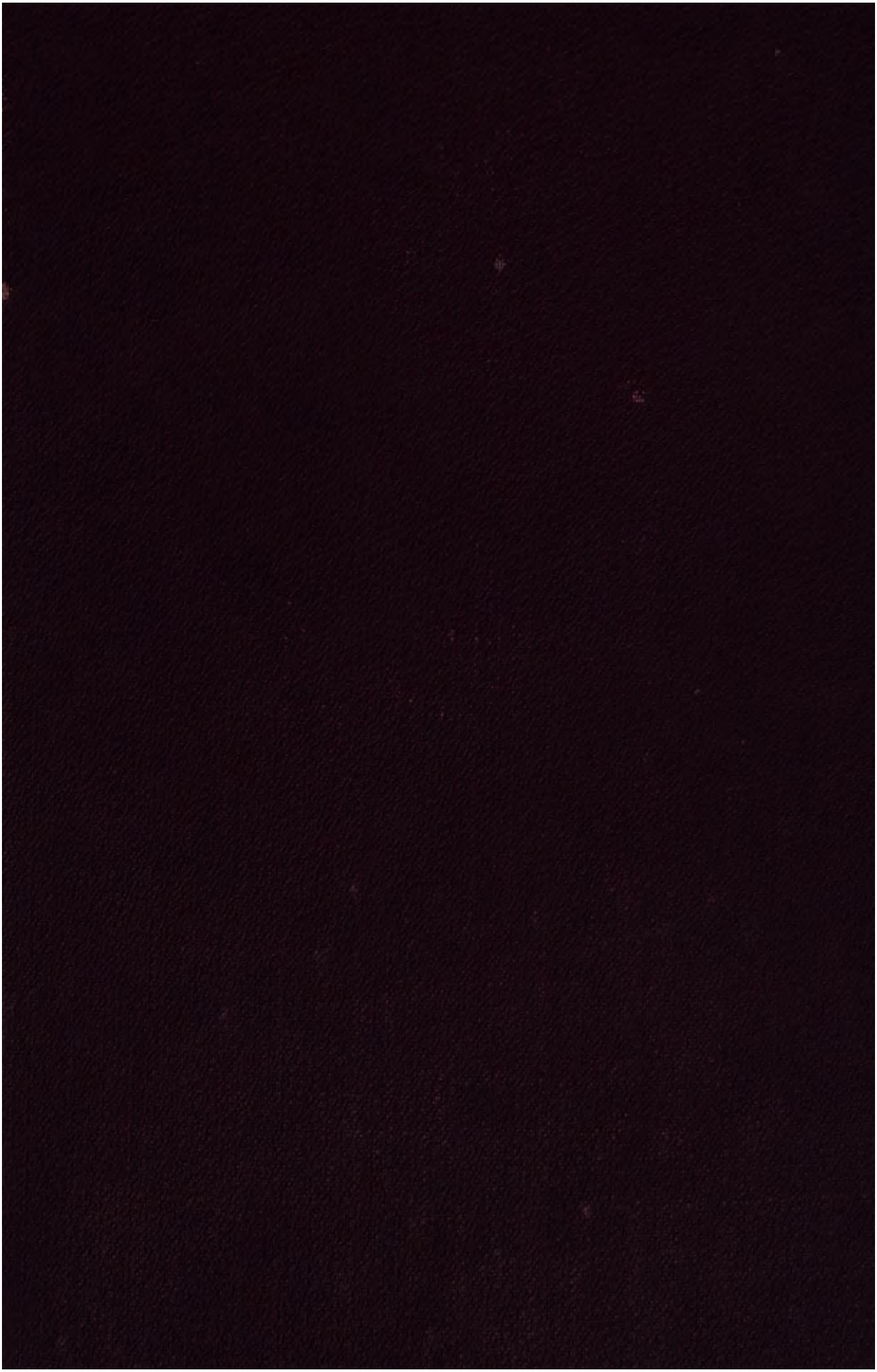

39-199

# SCHOOL BOTANY;

OR,

## AN EXPLANATION

OF

THE CHARACTERS AND DIFFERENCES OF THE PRINCIPAL NATURAL CLASSES AND ORDERS OF PLANTS BELONGING TO THE FLORA OF EUROPE,

IN THE BOTANICAL CLASSIFICATION OF

## DE CANDOLLE.


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FOR THE USE OF STUDENTS

PREPARING FOR THEIR MATRICULATION EXAMINATION IN THE UNIVERSITY OF LONDON.

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BY

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# PREFACE.

By the regulations of the University of London, it is required of all students, that, two years previously to proceeding to their examination for their first degree, they shall be examined, among other subjects, in "The characters and differences of the *principal* natural classes and orders of plants belonging to the Flora of Europe, in the botanical classification of De Candolle." See *Regulations of the University of London on the subject of Examinations for Degrees in Arts*, 1838, p. 4.

As this examination may be taken at the age of sixteen, it is necessary that boys should prepare themselves for it before they leave school, and therefore it will be a part of the duty of schoolmasters to cause their highest classes to be taught the kind of Botany required by the University.

The obvious purpose of this wise regulation is, to make young men acquainted with the names and properties of the common objects that surround them; to prevent their being thrown upon the world, as they often now are, ignorant of the commonest plants of their own country: and, in connection with this purpose, to oblige those who wish

to take degrees in the University to prepare themselves properly for the kind of studies to which their attention is ultimately to be directed; so that, when they come to the higher branches of natural science, they may not then have to waste their time in gaining a knowledge of the most ordinary elementary facts.

But, as Botany is a branch of learning now for the first time formally introduced into the plan of scholastic education, it is requisite that the teachers should know what to teach, in order that they may neither, on the one hand, treat the subject so superficially as to expose their students to the risk of being sent back by the University examiners, nor so extensively as to make it consume more of a boy's time than it is desirable for it to occupy.

Botany, however, is one of those sciences of observation which can only be studied advantageously after the enquirer has become acquainted with a considerable number of different species. In acquiring a knowledge of those species, it is desirable that principles and facts, which experience has shown to be important, should be interwoven with such elementary knowledge; so that, when the higher departments of this science come to be a subject of study, all that has been previously learned may be made to tell; and time not be wasted in consequence of the student having to acquire, when engaged in higher studies, such simple knowledge as he should have gained at school.

My experience in the art of teaching Botany, for the last ten years, leads me to believe it absolutely indispensable that a text-book for junior Botanical

classes, calculated to show what is required and what is unimportant, should be published expressly to meet the University regulations. Hence the origin of the present little book.

In selecting the subjects with which the student is to be made scientifically acquainted, I have generally chosen such as are nearly within any man's reach; and to render the acquisition of them the more easy, the vulgar names are added. A very small sum of money will enable every schoolmaster to cultivate all the species in a garden, where they may be constantly at hand.

In framing the technical characters of both genera and species, it has been my object to omit, as far as possible, all the more minute distinctions, the detection of which requires the aid of a microscope; on the other hand, I have particularly dwelt upon those which are obvious enough to be observed by any one having a pocket lens.

It is not to be understood that I suppose it necessary for a student to know every species contained into this book, though I see no reason why he should not study the greater part of them. In many natural orders various species are introduced, chiefly to give a teacher the opportunity of selecting such species as from local circumstances may be most accessible to him.

Which of the European natural orders I suppose the University to intend, by the expression "principal," is apparent from the prominence given, in this guide, to certain natural orders beyond others. I do not, however, recommend a teacher altogether to omit those which I have stated to be comparatively

unimportant. If I might advise, I should say that, in using this book, the wisest course is to make the students thoroughly acquainted, in the first instance, with the natural orders which are marked from I. to LXXXV., and then to explain more briefly the differences of those to which no numbers are prefixed.

In conclusion, I would particularly recommend the teacher to take care that, in addition to a small penknife, each student is provided with a pocket lens of about a half-inch focus, and a few quires of brown paper; the former to assist him in examining, and the latter in drying, the fresh specimens of plants daily brought before him. There is no method so certain as the latter, to accustom young persons to estimate correctly the differences between one plant and another; and, I presume, no one will think of teaching Botany, without an ample supply of fresh specimens, which he may distribute among his class, for the purpose of being examined and studied at leisure. Indeed I conceive it useless for a boy to study Botany, unless this indispensable provision is made for his acquisition of those habits of observation which render natural history so peculiarly useful as a branch of mental training.

University College,
Feb. 14. 1839.

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## CHAPTER IX.

# SCHOOL BOTANY.

## CHAPTER I.

### OF PLANTS IN GENERAL.

A PLANT in its most perfect state consists of various organs, intended by nature to answer different purposes. These are, 1. The *Root;* 2. The *Stem,* with 3. Its *buds;* 4. The *Leaves;* 5. The *Flowers;* 6. The *Calyx;* 7. The *Corolla;* 8. The *Stamens;* 9. The *Pistil;* 10. The *Fruit;* 11. The *Seed.*

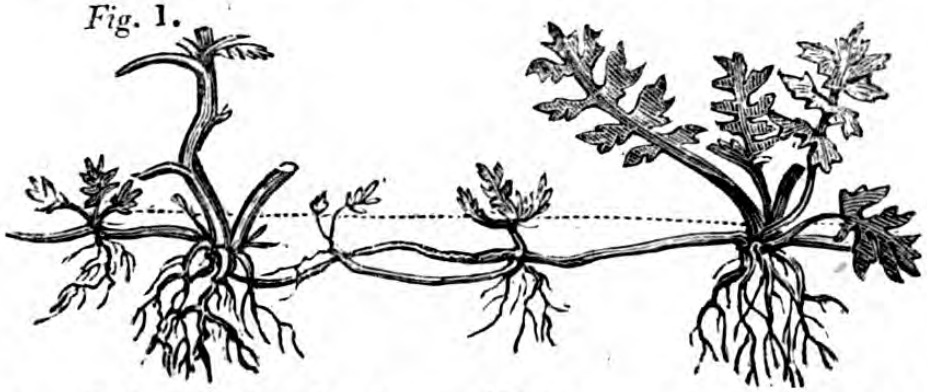
1. The ROOT is the part which fixes a plant to the ground, or to whatever else it may grow upon. It is divided into irregular branches, which when very small are called *fibres.* It never has any leaves upon its surface, nor scales (which are imperfect leaves); neither has it buds, except accidentally. It generally descends into the earth or avoids exposure to light.

Its office is to attract from the earth the liquid and gaseous matters which constitute the food of plants.

2. The STEM is the part which grows upwards from the root, and which bears leaves and flowers. Generally it is green, and divided into branches in a regular manner. The branches originate from *buds,* which are also disposed upon the stem with great regularity. Light appears necessary to maintain a stem in a green state, and we consequently find it only produced of such a colour in places exposed to that element.

But it is the nature of some plants to produce their stems underground, as well as above the surface. In that case the subterranean stem is not green, and its leaves, if it has any, are only little scales. Its buds are however present, and are capable of growing into branches, which rise above the surface of the ground and expose themselves to light, like those of the stem in its ordinary state. The *creeping root* (*fig.* 1.), as it

*Fig.* 1.



is called, of Couch Grass (Triticum repens) and of Mint (Mentha) is a long, slender, underground stem, and its real roots are the fibres which proceed from it. The *tuber* of the common Potatoe (Solanum tuberosum) is a thick, fleshy, underground stem, the *eyes* of which are its buds. What is named the root of a Crocus is a variety of the tuber, called a *cormus*.

The common stem has names expressive of particular modifications. When thick and woody, and forming the base of a tree, it is called a *trunk*, the first divisions of which are *branches*, and the last *twigs*. When it grows straight and quickly it is sometimes named a *shoot*. If feeble and prostrate, and rooting

*Fig.* 2.

into the ground at its joints, it is a *runner* (*fig.* 2.), as in the Strawberry (Fragaria). If prostrate and rooting

into the ground along its whole under surface it is a *rhizoma*, as in the Iris. If very vigorous, and produced from the base of a trunk or stem underground, it is called a *sucker*, as in the Asparagus. If very short, and producing annually young branches which live for a season and then perish, as in all herbaceous plants, it is named the *crown of the root*.

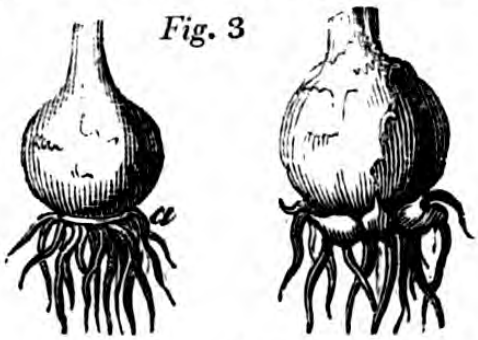
Sometimes branches are short, rigid, and sharp pointed, as in the Whitethorn (Cratægus Oxyacantha) and the Blackthorn (Prunus spinosa); they are then called *spines*.

If a stem is swelled at the part where the leaves grow, and capable of being snapped across, or apparently so, it is called *articulated* or *jointed*, as in Stellaria Holostea, and Geraniums.

The use of the stem is to convey into the leaves the fluid and other food obtained by the roots from the earth, and to carry it back again. Its length, and the distance at which the leaves are arranged upon it, render it well adapted to separating those organs from each other at a distance suitable to ensure their proper exposure to light and air.

3. The Bud is a little projection found at the axil of a leaf; that is to say, within the angle formed by the junction of a leaf to a stem. It is composed of *scales*, which are small leaves, and is the part from which the branch is formed. Sometimes its scales become fleshy, and the bud drops off the stem without

*Fig.* 3




at that time producing a branch, as in some Lilies; it is then called a *bulb* (*fig.* 3.). Very often the bulb is

formed underground upon a subterranean portion of the stem, as in the Hyacinth; it is then supposed vulgarly to be a root. The real roots are the fibres (*fig. 3. a*), which may be seen shooting downwards into water when the Hyacinth is grown in a glass.

4. The LEAF is an expansion of the stem, and consists of two parts, the *petiole* or *stalk*, and the *lamina* or *blade*. Some leaves have no stalks, and are therefore called *sessile*. The leaf contains *ribs* and *veins*, which branch in different ways; if they are so arranged that they form a kind of network they are said to be *reticulated*, as in the Currant (Ribes rubrum) and the Oak (Quercus Robur); if they run along side by side, as in Grasses, they are called *parallel*.

Leaves are said to be *simple* when, however much they are divided, they do not separate into distinct pieces; those of the Willow (Salix), of the Sycamore (Acer Pseudo-platanus), and of the Herb Robert (Geranium Robertianum), are all *simple*, although in the latter they are very much divided. But if they are cut into a number of distinct pieces they are called *compound*, as in the Pea (Pisum sativum) and the Ash tree (Fraxinus excelsior).

If leaves grow in pairs upon the stem, exactly opposite each other on the same level, as in the Wayfaring tree (Viburnum Opulus), they are said to be *opposite*; but if more than two leaves are opposite each other on the same level, as in the Goose grass (Galium cruciatum), they are called *verticillate* (*fig.* 4); if they do not grow upon the same level, but one is a little above or below the other, as in the Whitethorn, they are called *alternate*.

*Fig.* 4

The forms of leaves are better explained by figures

than descriptions; the following are representations of the most common varieties:—1, *linear;* 2, *lanceolate;* 3,

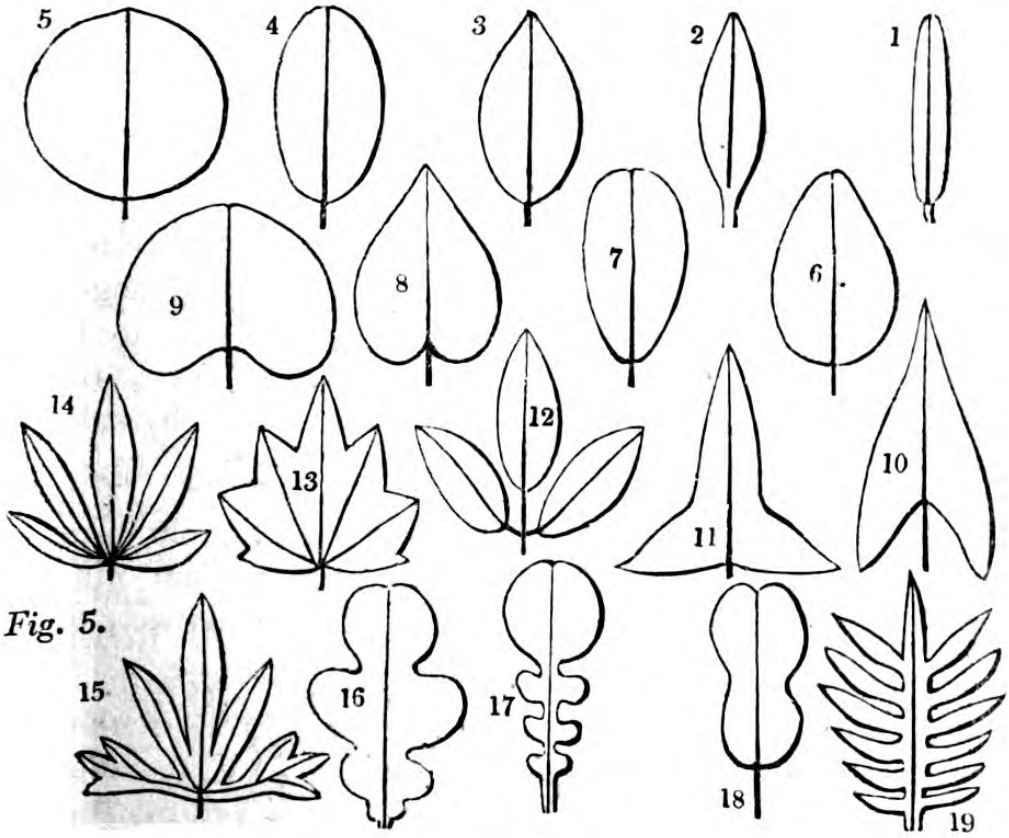



*Fig. 5.*

*oval;* 4, *oblong;* 5, *orbicular;* 6, *ovate;* 7, *obovate;* 8, *cordate;* 9, *reniform;* 10, *sagittate;* 11, *hastate;* 12,


*Fig. 6.*

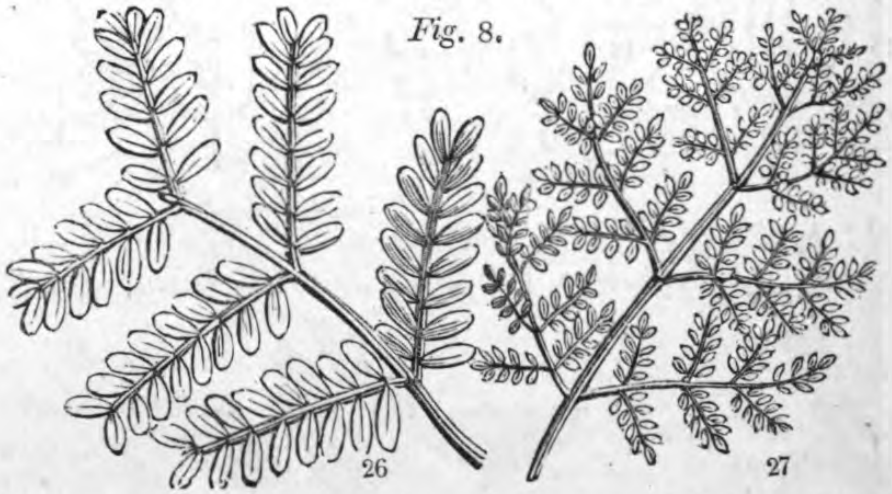
*ternate;* 13, *palmate;* 14, *digitate;* 15, *pedate;* 16, *sinuate;* 17, *lyrate;* 18, *panduriform;* 19, *pinnatifid;* 20, *pinnate* (*unequally*); 21, *pinnate* (*abruptly*).

Some leaves are repeatedly divided upon the same plan as that which determines their primitive form, and then they acquire very different appearances. Variations of such a kind are usually expressed by prefixing a Latin numeral to the word expressing the simple form; thus from *ternate* (*fig.* 7. *a*) come —22

*Fig.* 7.


*bi-ternate*, or twice-ternate, 23 *triternate*: from pinnatifid, 24 *bipinnatifid*, 25 *tripinnatifid*: from pinnate, 26 *bipinnate*, 27 *tripinnate*. If the division of

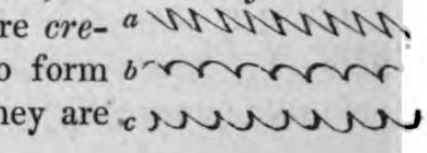
*Fig.* 8.




leaves is carried any further, they are called *decompound*, or *supradecompound*, as in the hemlock (Conium maculatum).

Some terms are taken from the manner in which the margins of leaves are toothed. If the toothings are sharp, and small, like those of a saw, the leaves are *serrate* (*fig.* 9. *a*); if rounded, as in Saxifraga umbrosa, they are *crenate* (*b*); if notched, so as to form segments of small circles, they are *dentate* (*c*).

*Fig.* 9.



With respect to their point, leaves are *obtuse*, or *acute*, in the ordinary sense of those words; if very blunt, they are *retuse;* if very much tapered to a point, they are *acuminate;* if with the midrib prolonged a little beyond the blade of the leaf, they are *mucronate;* if notched at the point, they are *emarginate;* if very much wider at the point than at any other part, they are *cuneate*, or *wedge-shaped.*

In some cases, as in the Pisum sativum, the midrib is lengthened, and acquires the power of twining round small bodies placed near it; it then has the name of *cirrhus*, or *tendril.*

Many leaves have, at their base, a pair of scales, one on each side, as the whitethorn, where they are large and green, and the mallow, where they are small and withered; these are called *stipules* (*fig.* 10. *b b*). It is

Fig. 10.

generally easy to distinguish them; but in some plants, as Polygonum amphibium, they form a membranous tube, or *ochrea* (*fig.* 10. *c*), surrounding the stem, and then are unlike their usual condition.

The petiole is usually round, or nearly so; but in grasses and other plants it is thin, and rolled round the stem, in which case it is called a *sheath*, or *vagina* (*fig.* 10. *d*). In such plants there is often a thin membrane called a ligula, at the upper end of the sheath.

The use of leaves is to convert into new matter the sap which they obtain from the stem; they also act as organs of respiration, and naturally contain a large

quantity of air. They are, therefore, at the same time the lungs and the stomach of a plant.

5. The FLOWER is the part which is formed for bringing about the multiplication of a plant by seed. It consists of various organs arranged in rings, or whorls, one within the other. The small leaves, out of whose axils the flowers grow, are called *bracts*. The stalk of the flower is its *peduncle;* and if the latter is divided into many smaller stalks, its divisions are called *pedicels*. Thus in the common Garden Hyacinth the stalk immediately rising from within the leaves is the peduncle; the small stalks, each of which bears a flower, are the pedicels; and the withered scales, out of whose axils the pedicels spring, are the bracts.

Bracts in different states have received different names. When a bract is large, and encloses a great many flowers, as in the Wake Robin (Arum maculatum), it is called a *spatha;* when many bracts are collected in a whorl round several flowers they form an *involucre*, as in the Dandelion (Taraxacum Dens Leonis) and Hemlock. The word *involucel* is used for an involucre which is secondary to one of a more general kind, as in the common Parsley (Petroselinum sativum), where the involucre is composed of only a few bracts at the base of the general umbel, while the involucels at the base of the partial umbels consist of many bracts.

The manner in which flowers are arranged is called their *inflorescence*. It is a sort of branching, and has different names, according to the manner in which the branches are arranged. The principal kinds are these:— 1. The *capitulum*, or *flowerhead*, when all the flowers are sessile upon a broad plate called a *receptacle*, as in the Daisy (Bellis perennis). 2. The *umbel*, when the pedicels all radiate from one point, as in the Fool's Parsley (Æthusa Cynapium). 3. The *spike*, when the flowers are sessile along a common peduncle, or axis, as in Ribgrass (Plantago lanceolata). 4. The *raceme*,

when the flowers are all stalked along a common axis, as in the Currant. 5. The *corymb*, when the flowers of a raceme are all on the same level, as in Candy tuft (Iberis). 6. The *panicle*, when the pedicels of a raceme are themselves branches, as in the Fiorin Grass (Agrostis stolonifera). 7. The *cyme*, when a panicle is corymbose and irregularly contracted, as in the Elder tree (Sambucus nigra). A *spadix* is the inflorescence inclosed in a spatha; an *amentum*, or *catkin*, is a spike consisting of imperfect flowers, as in the Willow (Salix) and Birch (Betula).

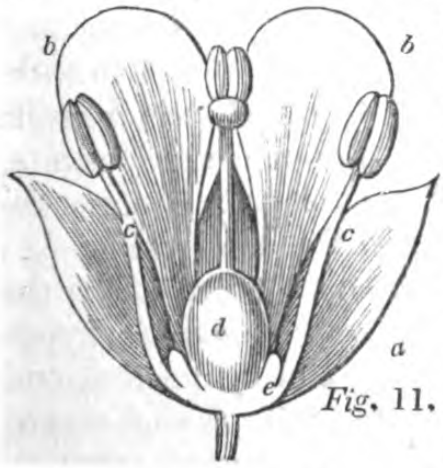


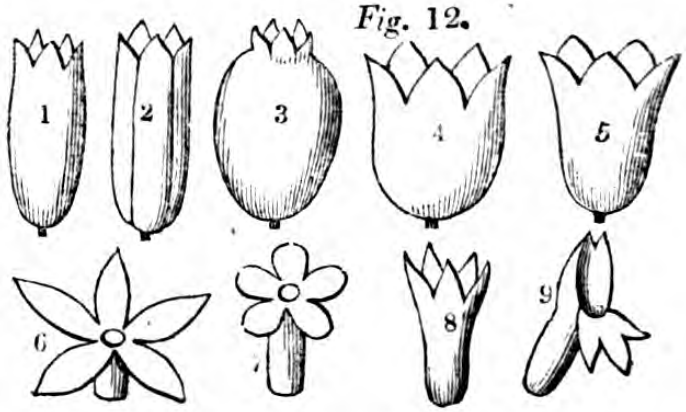
Fig. 11.

A flower, if complete in all its parts (*fig.* 11.), consists of a *calyx* (*a*), a *corolla* (*b*), *stamens* (*c*), and a *pistil* (*d*), with the addition in some cases of a disc (*e*).

6. The CALYX is a whorl of leaves called *sepals*, which are either separated from each other, or grown together by their edges into a cup. It is always on the outside of the flower, and is generally green; but sometimes it is of some other colour. Generally, the calyx grows free from the pistil, so as to leave the sides of the latter naked, as in the Shepherd's Purse (*Capsella Bursa Pastoris*), the Hyacinth, the Geranium, &c.; and in that case it is said to be *inferior* or *free*. But in many cases the calyx is united to the surface of the pistil, as in Parsley, the Currant, the Whitethorn, &c., and is then called *superior* or *adherent*.

Certain names are employed to express differences in the form of the calyx (and of all such parts); the principal of which are the following (*fig.* 12.): — 1, *tubular*, when it is of equal width at each end; 2, *prismatical*, when, being tubular, it is also regularly angular; 3, *ventricose*, when it is contracted at the

*Fig.* 12.




apex, so as to look as if inflated; 4, *cup-shaped,* when it resembles a drinking vessel of that name; 6, *rotate,* when it has a short tube, and a spreading border, the former representing the nave, and the latter the spokes of a (rota, or) wheel; 5, *campanulate,* when it has the form of a (campana or) bell; 7, *salver-shaped* (hypocrateriform), when its tube is long and cylindrical, and its border short and spreading flat; 8, *funnel-shaped* (infundibuliform), if it resembles an inverted cone; 9, *labiate,* if its parts are so united as to form two distinct lips.

It is also said to be *regular* if its parts are all of equal size, and *irregular* if they are of different sizes.

The manner in which the divisions of the calyx are fitted together before it expands is called its *æstivation,* and is in most cases one of two kinds — *valvate,* when the sepals join exactly by their edges, as in the Mallow (Malva sylvestris); or *imbricate,* when the sepals overlie each other at the edges, as in the Dog-rose (Rosa canina).

The use of the calyx is to assist in the protection of the interior, often more delicate, parts of the flower.

7. The Corolla is the whorl of leaves next the calyx in the inside; its parts are called *petals,* their narrow stalk, if they have one, the *unguis,* and their broad part the *limb.* This organ is usually more delicate, larger, and coloured more gaily than the calyx, but it is also in many cases like it in all these respects.

If the petals are all distinct, a corolla is said to be *polypetalous;* if they are united into a tube, it is called *monopetalous* or *gamopetalous.* Otherwise, the terms used in speaking of the corolla are much the same as those applied to the calyx.

It is usually the corolla which gives its great beauty to a flower, and it is supposed that its office is in part to attract the insects, which, by their motions when robbing it of its honey, assist in conveying the pollen to the stigma.

*Fig.* 13.


8. The STAMENS (*fig.* 13.) are the parts which stand next the corolla in the inside. They consist of a stalk or *filament* (*b*), and a head or *anther* (*a*), containing a powder named *pollen;* the filament may be absent, in which case the anther is *sessile.*

The filaments are usually distinct from each other, as in the Strawberry; sometimes they grow together into a tube, as in the Mallow, when they are *monadelphous.* Sometimes they grow together in two parcels, as in the common Pea, where nine are collected into one parcel, and one stamen stands by itself; in this case they are *diadelphous;* more rarely they combine into more than two parcels, as in various kinds of Hypericum, and are *polyadelphous.* If the filaments grow from immediately below the pistil, so that they remain behind when the calyx is pulled off, they are called *hypogynous;* but if they grow upon the sides of the calyx they are *perigynous;* if upon the sides of the corolla, they are *epipetalous,* and if upon the summit of the ovary, they are *epigynous.*

The anthers usually consist of two lobes, united by a part called the *connective;* they are in most cases distinct from each other, even though the filaments are combined; but sometimes grow together, when they are called *syngenesious,* as in the Sow-thistle (Sonchus oleraceus) and its allies. In the greater part of plants they open by longitudinal fissures; but sometimes, as

in the Heath (Calluna vulgaris), by pores at their points. They generally shed their pollen by openings along that side which faces the pistil, and are said to be *turned inwards;* now and then they shed it by openings along that side which faces the corolla, as in the Iris, and in that case are described as being *turned outwards.*

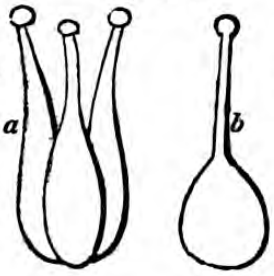
The office of the stamens is to fertilise the ovules, by conveying to the stigma the pollen, without which this purpose cannot be accomplished.

It not unfrequently occurs that between the stamens and the pistil there is a cup, or ring, or a waxy lining of the intervening part; to such an additional organ the name of *disk* is given (*fig.* 11. *e*)

9. The PISTIL (*fig.* 11. *d*) occupies the centre of the flower, and is composed of one or more bodies named *carpels,* which are either distinct from each other or combined into one organ. Each carpel consists of a hollow case, or *ovary,* extended at the point into a *style* or *styles,* which are tipped with a viscid secreting space called the *stigma.*

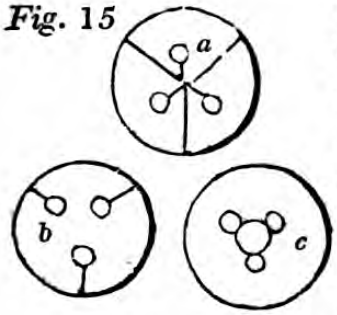
The interior of the ovary is called the *cell* (loculus). If the pistil contains but one cell in its ovary it is *unilocular;* but if there are more cells than one it is either *bilocular, trilocular, multilocular,* or otherwise, and the partitions that divide the cells from each other are called *dissepiments.* If the cells of the ovary are all consolidated into one body, as in the Water Lily (Nymphæa alba), the pistil is said to be *syncarpous* (*fig.* 14. *b*); if they are distinct from each other, as in the Larkspur (Delphinium), it is called *apocarpous* (*fig.* 14. *a*).

*Fig.* 14.



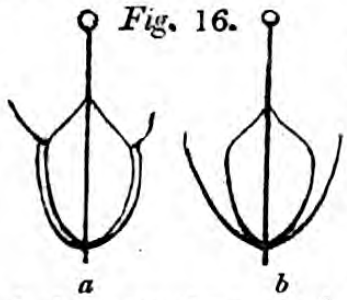

In the inside of the ovary is a space called the *placenta,* on which the young seeds, or *ovules,* originate. If this placenta grows from the sides of the ovary, as in

*Fig.* 15




the Poppy, it is *parietal* (*fig.* 15. *b*); if it grows in the middle of the ovary, without adhering to its sides, as in the wild Lychnis (Lychnis dioica) and Primrose (Primula veris), it is called *free central* (*fig.* 15. *c*); if it grows from a centre which is connected with the sides of the ovary by dissepiments, as in the Apple, it is *axile* (*fig.* 15. *a*).

*Fig.* 16.




When the ovary is distinct from the calyx it is called *free* or *superior* (*fig.* 16. *b*); if it grows to the sides of the calyx, *adherent* or *inferior* (*fig.* 16. *a*).

The part of the inside of the ovary from which the ovules grow, their number and their direction are different in different plants. In some cases they grow from the upper part of the cavity, and are *pendulous*, as in the Dandelion; in others they grow from the bottom of the cavity, as in the Scabious (Scabiosa), when they are *erect*. In the plants last named they are solitary, only one growing in the cavity of the ovary: in such species as the Poppy they are extremely numerous; and there are all intermediate numbers.

The ovary is intended as a covering and protection for the young ovules, which, after being fertilised, become seeds. The stigma is the body on which the pollen, or fertilising organ, falls; and the style conducts a part of that organ to the ovules.

10. The Fruit is the ripe pistil, containing the ovules arrived at the state of seeds. It may be very small, looking like a seed, as in the Sage (Salvia officinalis) and Wheat (Triticum hybernum); or it may be large and fleshy, as in the Gourd (Cucurbita Pepo) and the Apple (Pyrus Malus); or it may be hard and dry, as in the Cocoa Nut (Cocos nucifera);

or it may be thin and dry, splitting into pieces, as in the Lychnis. Its shell is called the *pericarp*. If it splits into pieces when ripe it is called *dehiscent;* if it does not split it is *indehiscent*. The pieces into which it splits are its *valves*.

All fruits which split into valves are commonly called *capsules*, with the exception of the *legume* or *pod* (*fig.* 17. *a*, *c*), which has two valves and a placenta on

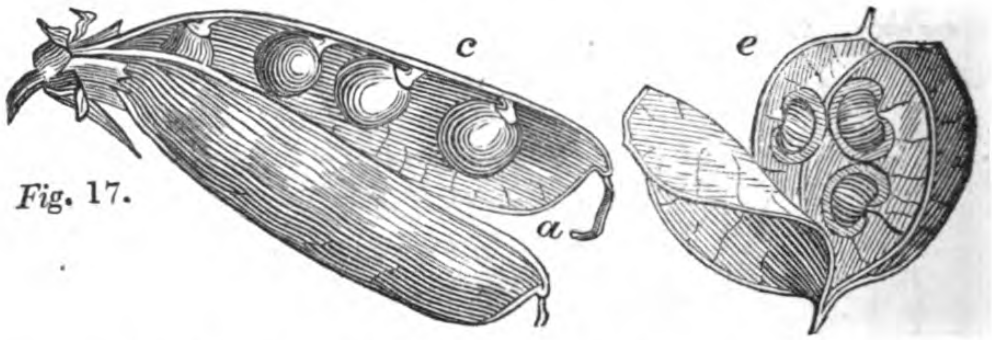


Fig. 17.

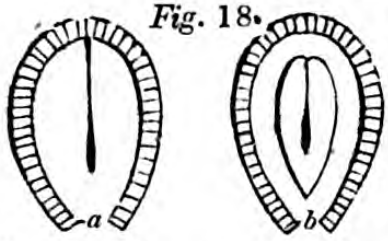
one side, as in the Pea; the *siliqua* or *silicula* (*fig.* 17. *e*), which has two valves that separate from a frame, to which the placenta adheres all round, as in the Radish (Raphanus sativus) and the Cabbage (Brassica oleracea); and the *follicle* which splits on one side only, through the placenta, as in the Pæony.

The principal kinds of indehiscent fruits are the *drupe*, which has a hard stone covered with flesh, as the Peach (Amygdalus Persica); the *samara* which is thin and extended at the back into a wing, as in Sycamore (Acer Pseudo-platanus) and Ash trees (Fraxinus excelsior); the *nut*, which is large, hard, and dry, as in the Filbert (Corylus Avellana); the *achænium*, which is small, seedlike, dry, and separates from the seed, as in the Dead Nettle (Lamium); the *caryopsis*, which is small, seedlike, dry, and united with the seed, as in Wheat and other corn; the *utriculus*, which is small and membranous, as in Chenopodium; and the *bacca* or *berry*, which is soft and fleshy, inclosing many seeds, as the Currant (Ribes rubrum) and Grape (Vitis vinifera).

11. The SEED is the full-grown ovule. It is the part which contains the *embryo* plant; its skin or coat is named *testa*, and the scar by which it adheres to the placenta is called the *hilum*.

There is frequently interposed between the embryo and the seed coat a substance called *albumen* (*fig.* 18. *b*), as in Polygonum, Wheat, and Ranunculus; but it is quite as common to find the embryo without any such substance, as in the Nut or the Almond (*fig.* 18. *a*).

*Fig.* 18.




The EMBRYO (*fig.* 19. and 20.) consists of three parts, the *radicle* (*a a*) or young root, the *cotyledons* (*c c*) or young leaves, and the *plumule* (*b b*) or young stem. The latter can however only be seen in large seeds like the Garden Bean. If the embryo has two cotyledons it is called *dicotyledonous*, as in the Bean (*fig.* 19.); if it has only one it is called *monocotyledonous*, as in Corn (*fig.* 20.).

*Fig.* 20.


*Fig.* 19.


12. In addition to the parts already mentioned the surface of plants is furnished with organs called *hairs*, *glands*, *scurf*, and *prickles*.

HAIRS are minute, soft, taper-pointed bodies which produce a white, or gray, or hoary appearance upon the part on which they grow. They give rise to the following names: *pubescent*, when they are short, soft, and thinly placed; *tomentose*, when they are short, soft, and closely placed; *pilose*, when they are long, soft, and thinly placed; *villous*, when they are long, soft, and thickly placed; *hirsute*, when they are long, harsh, and thickly placed. If hairs occupy only the edge of a body, it is said to be *ciliated*.

GLANDS are either hairs with a head or secreting organ, as in the Sweetbriar Rose (Rosa rubiginosa) or internal nuclei, such as may be seen in the rind of the Orange, or little tubercles upon various organs. This

name is also given to the warts or callosities which appear on the leaves or other parts of some plants, as in the common Peach.

Scurfs (lepides) are roundish minute scales, attached to plants by their middle, as in the Sea Buckthorn (Hippophäe rhamnoides); a part covered by them is said to be *lepidote.*

Prickles (*aculei*) are hard, sharp, conical projections, usually found on the stem, as in the Rose, and originating in the bark, from which they are easily broken off.

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The greater part of plants have all the preceding organs; but there are many plants which are destitute of one or other of them.

Some have no corolla, as Chenopodium, and are called *apetalous* or *monochlamydeous;* others have neither corolla nor calyx, as the Willow, and are *achlamydeous.* In particular species the stamens are found in one flower, and the pistil in another, as in Hemp (Cannabis sativa); such plants are called *unisexual.* If in such cases all the flowers of one plant are male or staminiferous, and all those on another are female or pistilliferous, such a plant is *diœcious;* but if both male and female flowers occur upon the same plant it is *monœcious;* and if on the same plant some flowers are male, others female, and others hermaphrodite, that is, composed of both organs the term *polygamous* is employed. In describing plants the sign ♂ is often employed to indicate male, ♀ female, and ⚥ hermaphordite; ☿ represents monœcious, ♂ ♀ diœcious, and ♂⚥♀ polygamous. A very large number of plants, called *cryptogamous,* have neither stamens nor pistil, as Ferns. Some plants have no leaves, as Cuscuta, others have neither leaves nor stem, but the two combined into one common organ, as Lemna and Lichens; and no inconsiderable number have no distinct leaves, stem, or root, as Confervæ, and microscopical Fungi.

Moreover, among those plants which are most com-

pletely organised, some have many rows of each particular organ of fructification; for example, the Ranunculus and Strawberry have many rows of stamens, the Waterlily has many rows of petals, and sepals; others, on the contrary, have the number extremely small; thus Marestail (Hippuris vulgaris) has only one stamen, Veronica only two, Grasses only three, Aconitum has only two petals, and Delphinium but four, while Aquelegia has five petals. And, in like manner, while the Strawberry has a great number of distinct ovaries, the Cherry has but one.

The result of such differences of structure, and of many others, is a great number of different species of plants, which it is the object of Systematical Botany so to *classify*, that a person unacquainted with them may find them in their places; that one already acquainted with them may, by turning to their station in the classification, know what is mentioned in books concerning them, and what others are associated with them on account of their resemblance; and that those who have acquired more proficiency in the science may be able to judge of the uses or properties of an unknown species by comparing it in his mind with some other with which he is already acquainted.

This end is obtained in several different ways; the manner in which it has been accomplished by M. De Candolle is explained in the succeeding pages.

## CHAP. II.

### OF THE CLASSES OF PLANTS.

If an observer, who had never heard anything of classification, were for the first time to arrange those plants known to him, it is probable that he would make use of such marks of difference as were anciently employed, and that his first classes would be trees, herbs, and grasses. But a little experience would show him that such an arrangement is vague and unsatisfactory; for he would not know where to place plants like Lavender, which is a herbaceous plant when young, and a small tree when old, or the tree Mallow, which is a herb in the North of Europe, and a tree in the South, or the Palma Christi (Ricinus), which is an annual in England, and a tree 15 feet high in Barbary and Spain; or the Bamboo, which is a grass in its leaves and flowers, but a tree in stature. Hence he would be driven to have recourse to other marks of distinction; and, if his experience were sufficiently great, he would at last discover those characters employed by Botanists of the present day.

M. De Candolle divides plants into three classes, — *Exogens*, *Endogens*, and *Cryptogamic plants*. They are distinguished in the following manner.

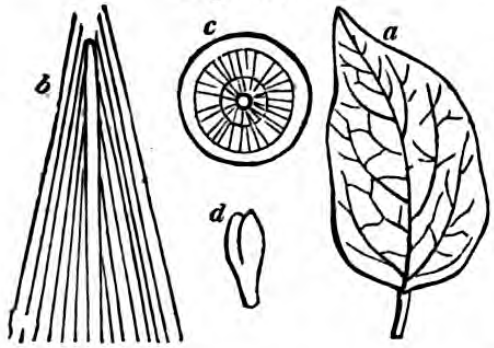
Exogens are all those plants whose leaves have their veins branched, and forming a sort of fine net work (*fig.* 21. *a*); as in the common Dock (Rumex), the Currant, the Oak, the Elm, the Mallow, &c. If a cross section of the stem of such plants is examined (*fig.* 21. *c*), it will be found to contain pith in the centre, then a ring of wood, and on the outside, a covering of bark. If the plant observed be a tree, it

will be readily seen that fine lines proceed in a radiating manner from the pith to the bark; and if it is not a tree the same lines will be found, only with some difficulty: such lines are called *medullary rays*. Supposing the seed can be examined, its embryo will be seen to be dicotyledonous (*fig.* 21. *d*), on which account Exogens are sometimes called *Dicotyledons*.

In its growth an Exogen gradually increases in the thickness of its stem, by forming the new wood over the old wood, beneath the bark, so that in an Exogen of a few years' growth there will be found as many concentric circles of wood as the plant is years old. In consequence of this, all the branches of Exogens are necessarily cones, for the lowest part must be the thickest, because it is the oldest (*fig.* 21. *b*).

It is very common to find that the number of parts in the flower of an Exogen is some power of 4 or 5; that is to say, that there are 5 sepals, and 5 petals, and 5, or 10, or 15, &c. stamens, and 5 carpels, as may be seen in the Meadow Sweet (Spiræa Ulmaria); or, at least, that this number prevails in the calyx, corolla, and stamens.

*Fig.* 21.




A large part of all the European Flora consists of Exogens; all the trees and bushes found wild in the north of Europe are exclusively of this class, and a considerable proportion of the herbaceous plants.

Endogens include all those plants whose leaves have their veins placed parallel; as Grasses, the Hyacinth, the Crocus, the Cornflag, &c. If a cross section of their stem (*fig.* 22. *c*) is examined, it presents to the eye no distinction of pith, wood, bark, and medullary rays, but it is a confused mass of pithy matter, in which woody bundles (or threads) are cut

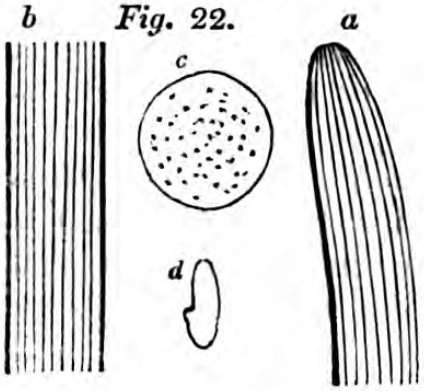
through, as in the Asparagus. The seed of an Endogen contains an embryo with only one cotyledon (*fig.* 22. *d*), on which account this class has been called *Monocotyledonous*.

In its growth, the stem of an Endogen increases but little in thickness; it lengthens, and becomes harder, by the introduction of new woody bundles into its interior; but, however old it may be, it never indicates its age by concentric circles of wood. For this reason it is generally cylindrical, not conical (*fig.* 22. *b*).

The number of parts of its flower is generally a power of three; that is to say, there are 3 sepals, 3 petals, 3, 6, 9, &c. stamens, and 3 carpels; as may be seen in the Iris, the Lily, and other plants.

Compared with Exogens, the class of Endogens is rare in Europe, if we abstract Grasses and Sedges, which constitute so large a part of all European herbage. There are no trees of the class in Europe excepting in the hottest of its countries, where the Palmetto (Chamærops humilis), the Date Palm (Phœnix dactylifera), and the American Aloe (Agave americana) are occasionally found either wild or naturalised.

*Fig.* 22.




Cryptogamic Plants, or Acrogens, differ essentially from the two other classes, in having no flowers, properly so called; multiplying themselves by bodies called spores. When they have stems, as in the Common Male Fern (Nephrodium Filix Mas), their wood is arranged in a zigzag manner, neither resembling the concentric circles of Exogens, nor the compressed, pithy, and fibrous structure of Endogens. If they have leaves, there is either no veins, or they are of the most simple kind, not branched or dividing at all; or, if they do branch, it is by continual forking. A large

proportion of these plants have neither leaves, nor stems, properly so called; as is seen in Lichens, Confervæ, and Fungi. Since they have no flowers, they cannot produce seeds, and consequently they have no embryo. They however form bodies resembling seeds, answering the same purpose, and called *spores*.

The differences between the three classes of Exogens, Endogens, and Cryptogamic Plants may be briefly expressed thus: —

| Classes. | Wood. | Leaves. | Flowers. | Embryo. |
|---|---|---|---|---|
| 1. Exogens | Concentric | Reticulated | $\sqrt[4.5]{}$ | Dicotyledonous. |
| 2. Endogens | Confused | Parallel-veined | $\sqrt[3]{}$ | Monocotyledonous. |
| 3. Cryptogamic | Sinuous, or 0. | Fork-veined, or 0. | 0. | 0. |

In applying these differences to practice, it is necessary to attend to the following rules.

The classes are not *absolutely* distinguished from each other by any one character, but by the *combination* of their characters. For this reason a plant may have one of the characters of a class to which it nevertheless does not belong, because its other characters are at variance with that class. Thus some species of Ranunculus have the flowers $\sqrt[3]{}$; but they do not on that account belong to Endogens, because their wood is concentric, their leaves netted, and their embryo dicotyledonous. Arum maculatum has reticulated leaves; but it is not an Exogen, because its wood is confused, and its embryo monocotyledonous; its flowers are neither $\sqrt[4.5]{}$ nor $\sqrt[3]{}$, all the parts being in a state of peculiarly diminished structure. The genus Potamogeton has the flowers $\sqrt[4]{}$; yet it does not belong to Exogens, because its leaves have parallel veins, and its embryo is monocotyledonous.

In estimating their value, the characters of the classes are to be placed thus: —1. Wood. 2. Embryo. 3. Leaves. 4. Flowers. The structure of the wood is of more

importance than all the others, because it indicates a whole series of differently modified vital phœnomena; the embryo is of more importance than the leaves, because it is the part which determines all the final structure of the plant; and the leaves are of more importance than the flowers, because they are intimately connected with the peculiar manner in which the wood of the stem is organised, and probably determine in the first instance the organisation of the flower itself.

Nevertheless, in practice, the leaves and flowers are the parts usually consulted, because they are the most readily seen, and because they are good external signs of internal organisation.

In judging of the number of parts in a flower, attention should be first given to the number of carpels; if they are 3, and all the surrounding parts are also a power of the same number, the plant will be an Endogen; but if they are not $\sqrt[3]{}$, or if, being some power of that number, the surrounding parts are $\sqrt[4.5]{}$, the plant will, in all probability, be an Exogen.

All leaves which are much divided are to be considered reticulated, and consequently the plants that bear them will be Exogens. The reason of this is, that if all the divisions of such leaves were joined together the leaves would in that case be reticulated. Common Fennel is a good example of this.

When leaves have only a single vein, or are so narrow that there is not room for any side veins to grow, as in Fir trees (Abies) and others, no opinion as to whether such plants are Exogens or Endogens can be formed from the inspection of those organs. But if the leaves have a contracted base, and are obviously articulated with the stem, they generally indicate an Exogen; on the contrary if they are not contracted at the base, and do not disarticulate from the stem, they generally indicate an Endogen.

## CHAP. III.

### OF THE SUBDIVISIONS OF EXOGENS.

THE class of Exogens is divided into four subclasses, characterised as follows.

Subclass 1. *Thalamifloræ.* Flowers furnished with both a calyx and corolla, the latter consisting of distinct petals. Stamens hypogynous, or united to the sides of the ovary, and not perigynous.

*Fig.* 23.

Subclass 2. *Calycifloræ.* Flowers furnished with both a calyx and corolla, the latter consisting of distinct petals. Stamens perigynous.

*Fig.* 24.

Subclass 3. *Corolliflorae.* Flowers furnished with both calyx and corolla, the latter consisting of united petals.

*Fig.* 25.

Subclass 4. *Monochlamydeæ.* Flowers having no corolla, and sometimes not even a calyx.

*Fig.* 26. *Fig.* 27.

Of these subclasses the two first are Polypetalous, the third is Monopetalous, and the fourth is Apetalous; so that they might be considered as only three subclasses, of which one is subdivided according to the manner in which the stamens are inserted. In this point of view the differences of the subclasses might be expressed thus: —

1. Polypetalous,
   Stamens hypogynous = *Thalamifloræ.*
   Stamens perigynous = *Calycifloræ.*
2. Monopetalous. = *Corollifloræ*
3. Apetalous. = *Monochlamydeæ.*

The object of this classification is to proceed from what are considered the most perfectly organised Exogens to those which are least so. Thus all the parts are present and distinct from each other in Thalamifloræ; other things remaining the same the stamens adhere to the calyx in Calycifloræ; the petals join together in Corollifloræ; and in Monochlamydeæ, first the corolla disappears, and then, among the most imperfect orders, the calyx also ceases to be developed.

## CHAP. IV.

### OF THALAMIFLORAL EXOGENS.

Of this subclass there are 19 principal orders belonging to the European Flora; namely,—

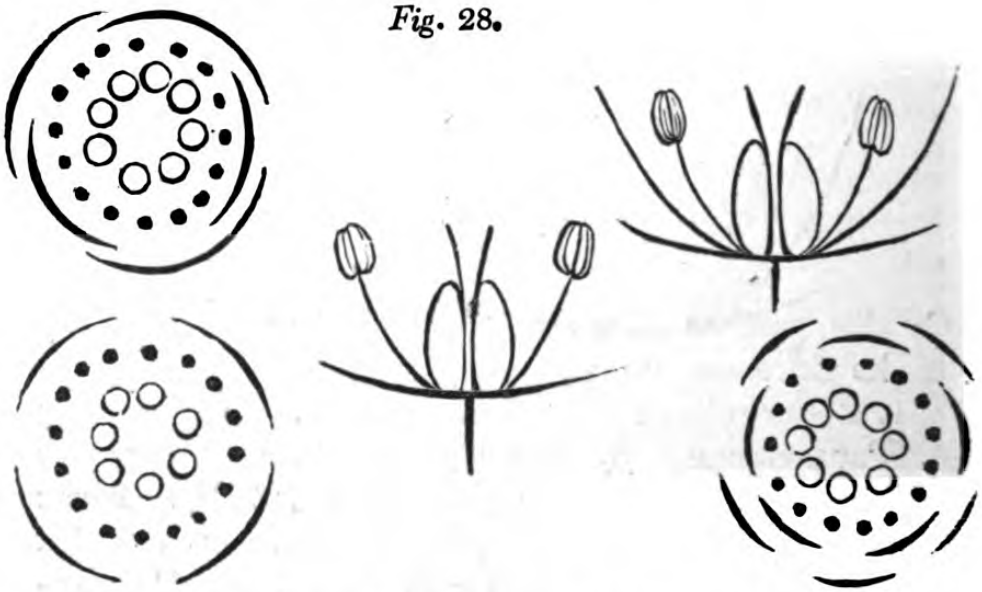
1. Ranunculaceæ; 2. Berberaceæ; 3. Nymphæaceæ; 4. Papaveraceæ; 5. Fumariaceæ; 6. Cruciferæ, or Brassicaceæ; 7. Cistaceæ; 8. Violaceæ; 9. Droseraceæ; 10. Polygalaceæ; 11. Caryophylleæ; 12. Linaceæ; 13. Malvaceæ; 14. Tiliaceæ; 15. Hypericaceæ; 16. Aceraceæ; 17. Geraniaceæ; 18. Oxalidaceæ; 19. Rutaceæ; which are placed in their present order by M. De Candolle, who distributes them through 5 *cohorts*. But as no idea of the nature or limits of these cohorts can be formed from a consideration of the Flora of Europe alone, it will be better to view the foregoing orders, and all future cases of a like nature, without reference to anything further than their differences from each other. For this purpose they may be briefly and differentially characterised as follows: *—

1. *Ranunculaceæ.* — Sepals and petals 3, 4, 5 each.

* To the brief characters of the orders prefixed to each of the following chapters, has been added a series of diagrams intended to represent the typical structure of each order, and to assist in explaining and fixing in the memory the corresponding verbal characters. In these diagrams the circles are supposed to represent the position of the parts, if examined by cutting a flower through transversely; the other figures are to be understood as expressing the appearance of the same parts in a vertical section. In the circular diagrams the central body is supposed to represent the pistil, in the interior of which are shown the placentæ, when the ovary is compound; the dots next the ovary stand for stamens; and the external curves are calyx and corolla, one or both, as the case may be: in this kind of diagram, æstivation, and the relative position of the parts, is best shown. In the other diagrams the meaning of the lines will be sufficiently apparent; it is only to be remarked, that when any organs grow together, this is represented by connecting them by means of a transverse, straight, or curved line.

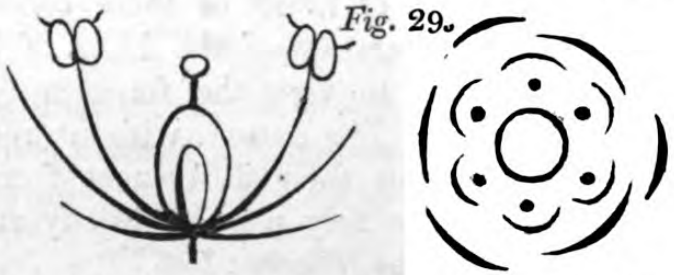
Stamens numerous. Anther-valves straight. Carpels more or less distinct.

*Fig.* 28.



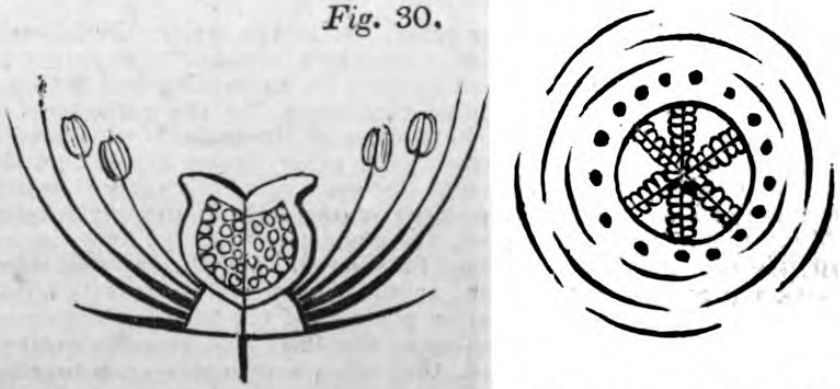
2. *Berberaceæ.* — Sepals, petals, and stamens, 6 or 8 each. Stamens opposite the petals, and equal to them in number. Anther-valves recurved. Carpel solitary.

*Fig.* 29.



3. *Nymphæaceæ.* — Sepals, petals, and stamens numerous. Carpels combined into a pistil of many cells,

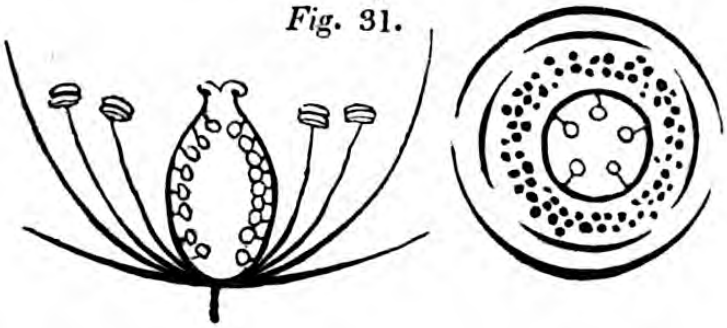
*Fig.* 30.



with the ovules growing all over the sides of the dissepiments.

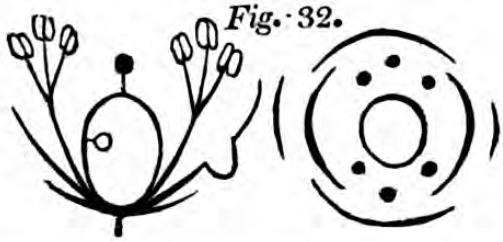
4. *Papaveraceæ.* — Sepals 2; petals 4. Stamens numerous. Carpels combined into a pistil of one cell, with parietal placentæ.

*Fig.* 31.



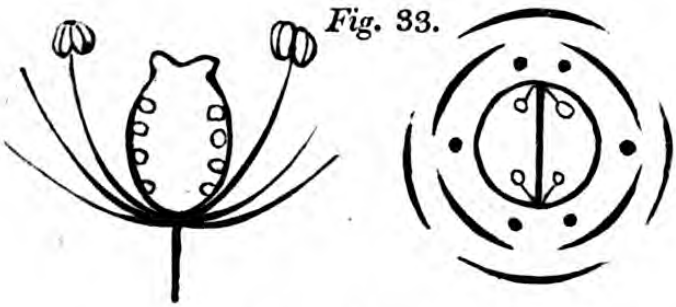
5. *Fumariaceæ.* — Sepals 2; petals 4. Stamens 6, in 2 parcels. Carpel solitary or two united, with parietal placentæ.

*Fig.* 32.



6. *Cruciferæ or Brassicaceæ.* — Sepals and petals 4 each. Stamens tetradynamous.* Fruit a siliqua or silicula.

*Fig.* 33.

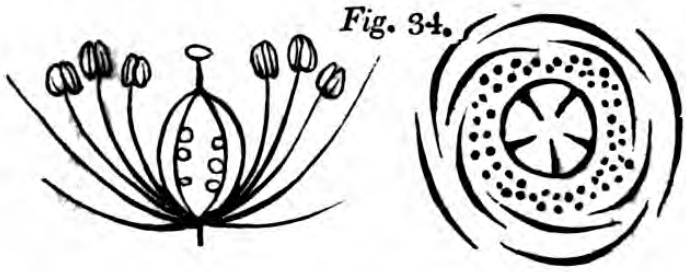


7. *Cistaceæ.* — Sepals and petals 5 each, the latter crumpled. Stamens numerous. Carpels consolidated

* Τετρα four, and δυναμις power. The stamens are supposed to form four distinct forces, two of which consist of single stamens, and two of twin ones. The name Tetradynamia was, on that account, given by Linnæus to a class having six stamens, four of which are long, and two short.

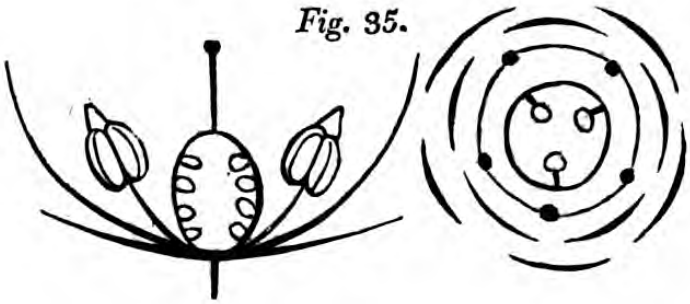
into a 1-celled ovary with parietal placentæ, or a many-celled ovary. Seeds with the radicle at their point.

*Fig.* 34.



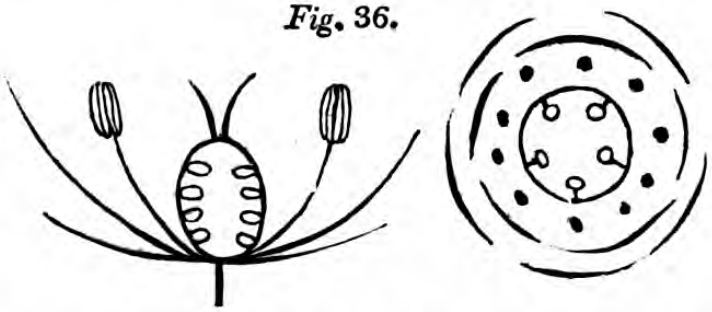
8. *Violaceæ.* — Flowers irregular. Sepals and petals 5 each. Stamens 5. Carpels combined into a 1-celled pistil, with 3 parietal placentæ. Style single.

*Fig.* 35.



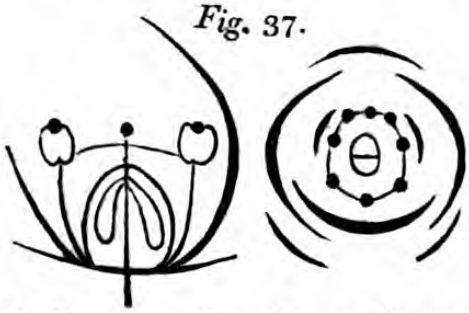
9. *Droseraceæ.* — Flowers regular. Sepals and petals 5 each. Stamens $\frac{5}{\infty}$. Carpels combined into a 1-celled pistil with 3-5 parietal placentæ. Styles 3 or 5.

*Fig.* 36.



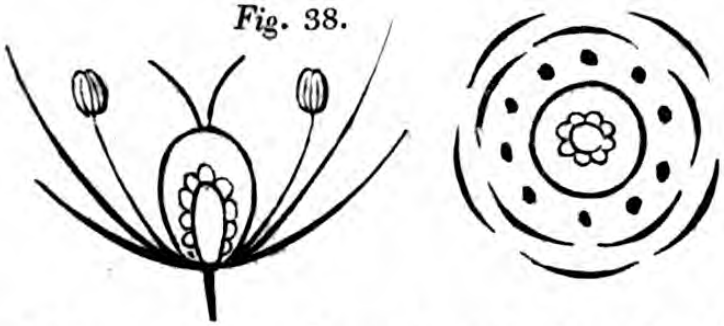
10. *Polygalaceæ.* — Sepals 5; very irregular, two petaloid. Petals 3; unequal, combined into a carinate lip. Stamens 8, monadelphous; anthers 1-celled, opening by a pore. Carpels combined in a 2- or 3-celled ovary, with solitary pendulous ovules.

*Fig.* 37.



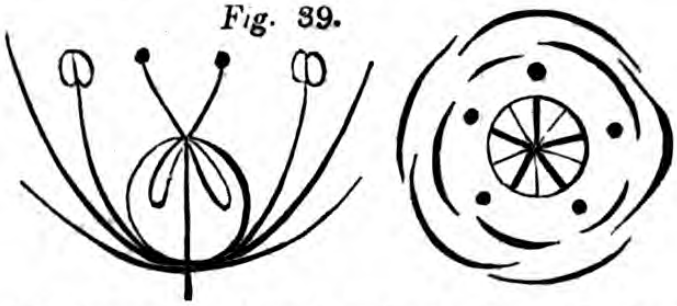
11. *Caryophylleæ.* — Sepals and petals 5 each. Stamens $\frac{5}{\infty}$. Carpels combined into a 1-celled pistil with a free central placenta. Stigmas several, distinct.

*Fig.* 38.



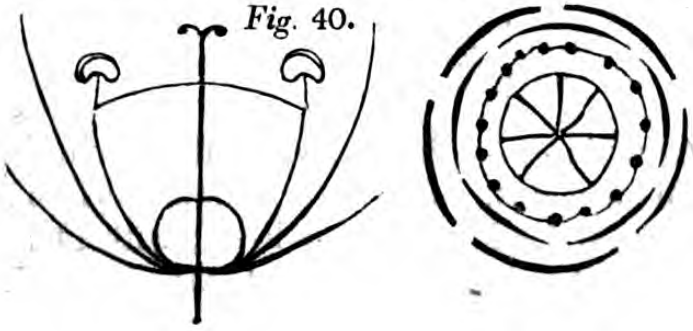
12. *Linaceæ.* — Sepals and petals 4 or 5 each, imbricated. Stamens 8-10, monadelphous, half abortive. Carpels combined into a many-celled pistil with pendulous solitary ovules. Stigmas distinct.

*Fig.* 39.



13. *Malvaceæ.* — Sepals valvate, 5; petals 5. Stamens

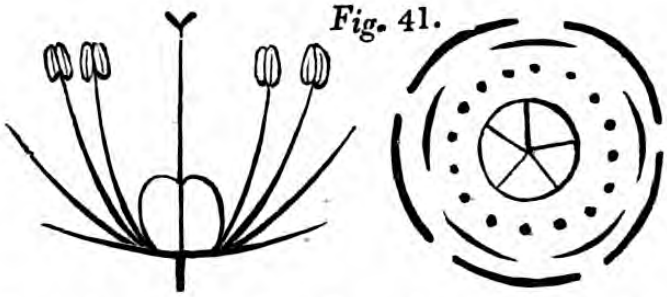
*Fig.* 40.



numerous, monadelphous. Carpels combined into a many-celled pistil, with solitary ovules.

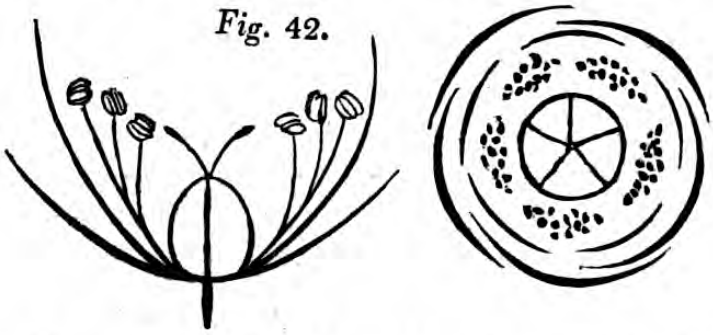
14. *Tiliaceæ.* — Like Malvaceæ, but stamens distinct.

*Fig.* 41.



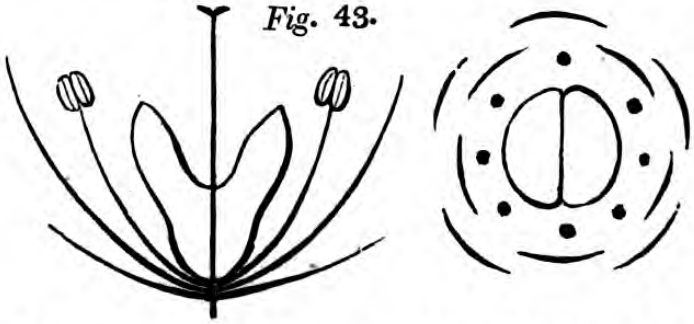
15. *Hypericaceæ.* — Sepals and petals 5 each, dotted. Stamens numerous, polyadelphous. Carpels combined into a pistil with several cells. Styles distinct.

*Fig.* 42.



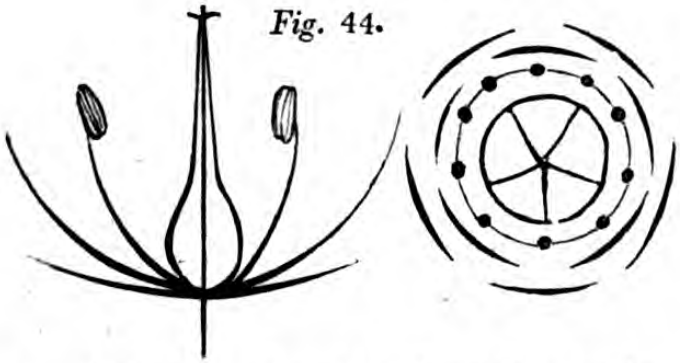
16. *Aceraceæ.* — Sepals and petals 5 each. Stamens 8. Carpels combined into a 2-lobed, 2-celled pistil. Style 1. Fruit winged (samaroid).

*Fig.* 43.



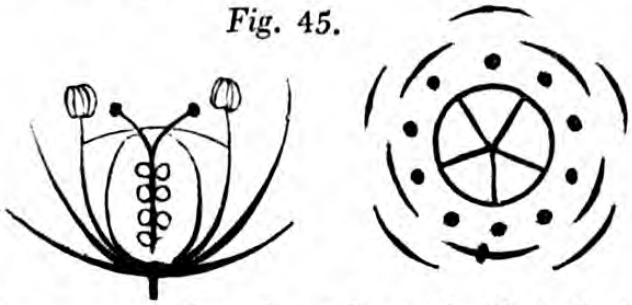
17. *Geraniaceæ.* — Sepals and petals 5 each. Stamens 10, in part abortive. Carpels 5, combined into a pistil with 5 cells, and a long beak. Fruit, with a long beak, round which the ripe elastic carpels are arranged.

*Fig.* 44.



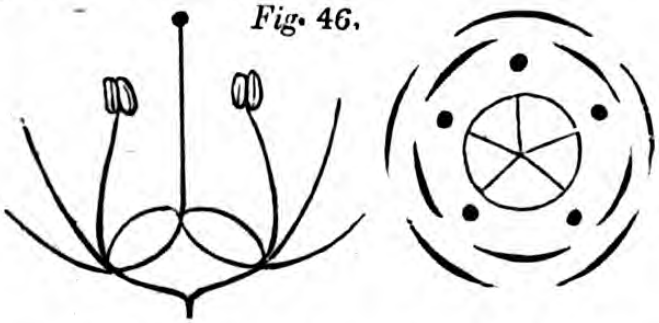
18. *Oxalidaceæ.* — Sepals and petals 5 each. Stamens 10, monadelphous. Carpels united into a pistil, with 5 polyspermous cells. Stigmas distinct. Fruit bursting with elasticity.

*Fig.* 45.



19. *Rutaceæ.* — Sepals and petals dotted, 4-5 each. Stamens of the same power as the sepals. Carpels combined into a 4 or 5-lobed pistil, with as many cells as lobes, and 1 or 2 ovules in each. Style simple. Fruit bursting with elasticity.

*Fig.* 46.



The examination of the preceding characters requires to be more careful than beginners are generally capable of. In appreciating the differences of the orders, the student will derive assistance from the following tabular view, which comprises a few additional characters beyond those given above.

A. *Stamens indefinite; that is to say, more numerous than can be easily counted.*

*a.* Carpels either wholly or in part distinct from each other - - *Ranunculaceæ.*

*b.* Carpels united into a pistil having more than one placenta.

*α.* Ovary 1-celled, with parietal placentæ. Sepals 4, deciduous. - - *Papaveraceæ.*

*β.* Ovary 1-celled, with parietal placentæ. Sepals 5, permanent, and much imbricated. *Cistaceæ.*

*γ.* Ovary many-celled, with imbricated sepals and ovules growing all over the sides of the dissepiments. - - *Nymphæaceæ.*

*δ.* Ovary many-celled, with imbricated dotted sepals, polyadelphous stamens, and ovules growing in the axis of the ovary. *Hypericaceæ.*

*ε.* Ovary many-celled, with valvate sepals, and monadelphous stamens. - *Malvaceæ.*

*ζ.* Ovary many-celled, with valvate sepals, and distinct stamens. - - *Tiliaceæ.*

B. *Stamens definite; that is to say, obviously corresponding in number with the sepals and petals.*

*a.* Flowers unsymmetrical, with tetradynamous stamens and a siliquose fruit. - *Cruciferæ.*

*b.* Flowers unsymmetrical, with 8 stamens, and a samaroid fruit. - - *Aceraceæ.*

*c.* Flowers symmetrical.

*α.* Flowers irregular, with 2 petaloid, and 3 herbaceous sepals. - - *Polygalaceæ.*

*β.* Flowers irregular, with 2 minute sepals, and 4 closely pressed petals, in 2 rows. *Fumariaceæ.*

*γ.* Flowers irregular, with 5 equal sepals, and 5 petals in one row. - - *Violaceæ.*

*δ.* Flowers regular, with recurved anther-valves. - - - *Berberaceæ.*

*ε.* Flowers regular, with straight anther-valves, parietal placentation, and gyrate foliation. *Droseraceæ.*

ζ. Flowers regular, with straight anther-valves, a free central placenta, and opposite entire leaves with tumid nodes. - *Caryophylleæ.*

η. Flowers regular, with the placenta in the axis.

* Carpels 1-seeded, surrounding a long beak. Leaves with stipules. - *Geraniaceæ.*

** Carpels 1- or 2-seeded, not surrounding a beak. Stamens monadelphous. *Linaceæ.*

*** Carpels 1- or 2-seeded, not surrounding a beak. Stamens free. Leaves dotted. *Rutaceæ.*

**** Carpels many-seeded. - *Oxalidaceæ.*

The following is a more detailed account of these orders, and of some of the common genera and species belonging to them.

## I. RANUNCULACEÆ.

Essential Character. — *Sepals* 3-6, usually, deciduous, sometimes unequal. *Petals* 3-15, in one or more rows, distinct, sometimes unequal, sometimes partly or wholly missing. *Stamens* indefinite in number, hypogynous. *Carpels* numerous, seated on a torus, 1-celled or united into a single many-celled pistil. *Fruit* either consisting of dry akenia, or baccate with one or more seeds, or follicular with one or two valves. — *Herbs,* or very rarely *shrubs. Leaves* alternate or opposite, generally much divided, with the petiole dilated and forming a sheath half clasping the stem. *Stipules* occasionally present. *Hairs,* if any, simple. *Inflorescence* variable.

*** These plants are distinguished from Rosaceæ, which they often resemble, by having a deciduous calyx to which the stamens do not adhere; the latter part of this character is the most important, because Pæonia, which belongs to Ranunculaceæ, has a permanent calyx.

### Ranunculus.

Sepals 3 or 5. Petals the same number, with a nectariferous scale at the base. Carpels numerous, seed-like.

1. R. *aquatilis.* A floating plant. The floating leaves reniform, lobed or split; the submersed leaves cut into fine segments. Flowers white. ——— *Common in ponds and ditches.*

2. R. *hederaceus.* A floating plant. The leaves all alike, reniform, obsoletely 5-lobed. Flowers white. ——— *Common in ponds and ditches.*

3. R. *flammula.* Leaves elliptical lanceolate or linear. Stem ascending or prostrate, often rooting, many-flowered. Carpels obovate, smooth, obscurely bordered, with a short terminal point. ——— *Ditches and wet meadows.*

4. R. *acris.* (*Crowfoot.*) Root-leaves divided in a palmate manner; the segments somewhat lozenge-shaped, cut, and sharply toothed; the leaves of the stem the same shape, the uppermost divided into 3 linear segments. Stem many-flowered. Peduncles tapering. Carpels lenticular, compressed, bordered, with a beak, which is rather curved, and much shorter than the carpel. Receptacle smooth. ——— *Common in meadows and pastures.*

5. R. *bulbosus.* Root-leaves ternate or biternate; the leaflets trifid, cut and toothed. Peduncles furrowed. Sepals reflexed. Carpels lenticular, compressed, bordered, smooth. Stem bulbous at the base. ——— *Common in meadows.*

6. R. *sceleratus.* All the parts very smooth and watery. Lower leaves palmate, with crenated incisions, upper trifid with linear segments. Sepals reflexed. Head of carpels long and narrow. ——— *Wet ditches.*

### Caltha.

Sepals 5, in the position of the calyx, but with the colour and texture of petals. Capsules 5-10, many-seeded.

1. C. *palustris* (*Marsh Marigold*). Stem ascending. Leaves roundish cordate, minutely crenated ——— *Meadows and wet ditches.*

### Anemone.

Calyx with five or more imbricated sepals, coloured like a corolla, and assuming the appearance of one, usually with an involucre a little below it. Achænia one-seeded, placed upon an elevated receptacle, and terminated by long feathery styles, or closely covered with wool.

1. A. *Pulsatilla* (*Pasque Flower*). Leaves tripinnatifid with linear acute segments. Flower erect, hairy, purple, campanulate at the base, reflexed at the edge. Leaves of the involucre sessile, many-parted. Fruit terminated by long hairy tails. ——— *Chalky hills.*

2. A. *coronaria* (*fig.* 47.) (*Garden Anemone*). Leaves ternate, with multifid linear mucronate segments. Involucre sessile. Flowers of about six sepals, large, hairy, red, white, or purple. Fruit buried in wool. ——— *South of Europe. Common in gardens.*

*Fig.* 47. *Fig.* 48.


3. A. *hortensis* (*fig.* 48.). Radical leaves 3-5-parted, with the segments oblong, toothed, and cut, and wedge-shaped at the base. Involucre sessile, with the segments undivided or trifid. Flower erect, bright purple, with 8-12 sepals. Fruit covered with wool. ——— *Thickets in the middle parts of Europe. Common in gardens.*

### Aquilegia.

Sepals 5, petal-like. Petals 5, funnel-shaped, with a spur at the base. Capsules 5.

1. A. *vulgaris* (*Columbine*). Leaves biternate; leaflets 3-lobed, with ovate, rounded crenatures. Spurs hooked at the point. Flowers blue. ——— *Hedges and thickets. Common in gardens.*

### Aconitum.

Sepals 5, petal-like, the upper arched. Petals 2, hooded, spurred, with long stalks; three others very small, scale-like, often wanting. Carpels 3-5, many-seeded.

1. A. *Napellus.* Stem leafy, about three feet high. Leaves divided into many fine lobes. Flowers deep purplish-blue, in racemes, downy. Upper sepal very convex and compressed. Petals with a curved stalk, horizontal. Seeds 3-cornered, with

many plaited wrinkles at the back. ——— *Common in gardens. Alps of Europe.*

DELPHINIUM.

Sepals 5, petaloid; the upper one with a spur. Petals 4; the two upper spurred, included in the spur of the upper sepal; the other two convex and spurless, often hairy in the middle. Capsules 1 to 5, many-seeded.

*Several species common in gardens, under the name of Larkspurs.*

PÆONIA.

Sepals 5, permanent, unequal, herbaceous. Petals 5, or more. Carpels 2 or 3, many-seeded, opening by their inner face when ripe.

1. P. *officinalis* (*Common Pæony*). Leaves biternate, or ternate-bipinnate; leaflets oblong or lanceolate, smooth on both sides. Stem obsoletely angular. ——— *Gardens. Woods of Europe.*

## II. BERBERACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 3-4-6, deciduous, in a double row, surrounded externally by petaloid scales. *Petals* either equal to the sepals in number, and opposite to them, or twice as many. *Stamens* equal in number to the petals, and opposite to them; *anthers* generally with two cells, opening with a valve from the bottom to the top. *Ovary* solitary, 1-celled. *Fruit* berried or capsular. *Seeds* attached to the bottom of the cell on one side, 1, 2, or 3. — *Shrubs* or *herbaceous perennial* plants, for the most part smooth. *Leaves* alternate, compound, usually without *stipules*.

*Fig.* 49.

*** The anthers opening by valves distinguish this

order from all others belonging to Europe, except Lauraceæ, which have no petals.

BERBERIS.

Sepals 6. Petals 6, with two glands inside at the base. Berry with two seeds.

1. B. *vulgaris* (*fig.* 49.) (*Common Berberry*). A bush with palmate or 3-lobed spines. Leaves fascicled, obovate, with ciliated serratures. Racemes many-flowered, pendulous. Petals yellow, entire or slightly emarginate. ——— *In hedges and plantations.*

## III. NYMPHÆACEÆ.

ESSENTIAL CHARACTER. — *Sepals* and *petals* numerous, imbricated, passing gradually into each other, the former persistent, the latter inserted upon the disk which surrounds the pistil. *Stamens* numerous, inserted above the petals into the disk, sometimes forming, with the combined petals, a superior monopetalous corolla; *filaments* petaloid. *Disk* large, fleshy, surrounding the ovary more or less. *Ovary* polyspermous, many-celled, with the stigmas radiating from a common centre upon a cap. *Fruit* many celled, indehiscent. *Seeds* numerous, attached to spongy dissepiments, and enveloped in a gelatinous aril. — *Herbs,* with peltate or cordate fleshy leaves, arising from a prostrate trunk, growing in quiet waters.

*** These are what we commonly call *Water Lilies.* They are known from Ranunculaceæ by their permanent calyx and consolidated carpels, and from Papaveraceæ by their dissepiments, and by being floating water plants.

NYMPHÆA.

Sepals 4. Petals numerous, larger than the sepals. Stamens united to the sides of the ovary. Stigma with many rays.

1. N. *alba* (*White Water Lily*). Leaves roundish, deeply

cordate, quite entire. Flowers white. ——— *Stagnant or slowly running water.*

NUPHAR.

Sepals 5. Petals numerous, small, with a honey pore at the back. Stamens distinct from the ovary. Stigma stellate, toothed.

1. N. *luteum* (*Yellow Water Lily*). Leaves oval, split at the base for a third of their breadth. Flowers yellow. ——— *Stagnant or slowly running water.*

## IV. PAPAVERACEÆ.

ESSENTIAL CHARACTER.—*Sepals* 2, deciduous. *Petals* either 4, or some multiple of that number. *Stamens* hypogynous, generally very numerous; *anthers* 2-celled, innate. *Ovary* 1-celled, with parietal placentæ. *Stigmas* 2 or many; in the latter case stellate upon the flat apex of the ovary. *Fruit* 1-celled, either pod-shaped, with 2 parietal placentæ, or capsular, with several placentæ. *Seeds* numerous. — *Herbaceous* plants or *shrubs*, with a milky.

*** Readily known by their deciduous calyx and parietal placentæ. The former character divides them from Cistaceæ; the latter from Ranunculaceæ and Nymphæaceæ. They are known from Brassicaceæ or Cruciferæ, by their stamens not being tetradynamous.

PAPAVER.

Sepals 2. Petals 4, crumpled. Stamens very numerous. Ovary roundish, with many placentæ; stigma radiating.

1. P. *Rhœas* (*Redweed, Red Poppy*). Leaves pinnate or tripinnate; with oblong, lanceolate, cut and toothed segments. Filaments subulate. Capsule obovate, rounded at the base, smooth. ——— *Corn fields, and among rubbish.*

CHELIDONIUM.

Sepals 2. Petals 4. Stamens many. Capsule pod-shaped, 2-valved, with 2 placentæ.

1. C. *majus* (*Celandine*). Leaves very deeply pinnatifid,

with rounded notched lobes. Flowers small, yellow, in umbels. All the parts yielding an orange coloured juice. ——— *Waste places.*

## V. FUMARIACEÆ.

ESSENTIAL CHARACTER, — *Sepals* 2, deciduous. *Petals* 4, cruciate, parallel; the 2 outer, either one or both, saccate at the base; the 2 inner callous and coloured at the apex, where they cohere and enclose the anthers and stigma. *Stamens* 6, in 2 parcels, opposite the outer petals. *Ovary* superior; *ovules* horizontal; *style* filiform; *stigma* with two or more points. *Fruit* various; either an indehiscent nut, or a 2-valved pod.—*Herbaceous* plants, with brittle stems and a watery juice. *Leaves* usually alternate, multifid, often with tendrils. *Flowers* purple, white, or yellow.

*** The two small sepals, 4 irregular petals firmly adhering at the tips, and the diadelphous stamens at once mark this order.

### FUMARIA.

Sepals 2, minute. Petals 4, the upper one spurred at the base. Fruit a one-seeded nut.

1. *F. officinalis* (*Fumitory*). Leaves in many linear-oblong segments. Racemes lax when in fruit. Flowers pale purple, small. Fruit round, depressed at the end. ——— *Hedges and waste places.*

## VI. CRUCIFERÆ, OR BRASSICACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 4, deciduous. *Petals* 4, cruciate. *Stamens* 6, of which 2 are shorter, solitary; and 4 longer, in pairs. *Disk* with various green glands between the petals and the stamens, and ovary. *Ovary* superior, with parietal placentæ usually meeting in the middle, and forming a spurious dissepiment. *Stigmas* 2, opposite the placentæ. *Fruit* a silique or silicule, 1-celled, or spuriously 2-celled; 1- or many-seeded; dehiscing

by two valves separating from the replum; or inde hiscent. *Seeds* attached in a single row to each side of the placenta, generally pendulous. *Albumen* none. *Embryo* with the radicle folded upon the cotyledons. —*Herbaceous* plants, annual, biennial, or perennial, very seldom suffruticose. *Leaves* alternate. *Flowers* usually yellow or white, seldom purple, without bracts.

*** No other order has tetradynamous stamens. Various methods have been proposed for arranging the genera of this difficult order. That of De Candolle, from the manner in which the embryo is folded up, is usually followed; but the characters on which it depends are too minute for use by beginners.

§ 1. LOMENTACEÆ. *Fruit separating transversely into one- or many-seeded joints.*

RAPHANUS.

Calyx with two pouches at the base. Petals obovate or obcordate. Silique taper, many-celled transversely, with a long, conical, taper-pointed style. Seeds globose, in one row.

1. R. *sativus* (*Garden Radish*). Root fleshy, long or round. Leaves lyrate, with rough hairs. Flowers light purple. Siliques knotted, hardly longer than their stalks. ——— *Common in gardens.*

§ 2. SILICULOSÆ. *Fruit a silicle, that is, about as broad as long.*

CORONOPUS.

Silicle double; valves ventricose or slightly carinate, scarcely dehiscing, 1-seeded. Seeds roundish, 3-cornered. Cotyledons incumbent, linear. Racemes opposite the leaves. Flowers white.

1. C. *Ruellii* (*Star of the Earth*). Silicle undivided, crested with little sharp points. Style prominent. Leaves pinnatifid, subdivided. Stem quite prostrate, radiating. ——— *Common in waste places.*

IBERIS.

Two exterior petals larger than the others. Silicle much compressed, truncate-emarginate. Seeds ovate, pendulous.

1. I. *umbellata* (*Candy Tuft*). An annual herbaceous plant. Leaves lanceolate, acuminate, quite entire except the lower ones, which are slightly toothed. Silicles in close umbellate corymbs, bifid, with the lobes extended into points as long as the cells to which they belong. ——— *Waste places, South of Europe. Common in gardens.*

### Lepidium.

Calyx equal at the base. Petals entire. Silicle ovate, or somewhat cordate; valves keeled, or occasionally ventricose, dehiscing; cells 1-seeded. Seeds somewhat triquetrous, or compressed. Racemes terminal. Flowers white.

1. L. *sativum* (*Garden Cress*). An annual. Quite smooth. The leaves variously cut and lobed, the upper quite entire. —— *Common in gardens.*

### Capsella.

Calyx equal at the base. Silicle triangular, wedge-shaped at the base; valves navicular, apterous; cells many-seeded. Racemes terminal. Flowers white.

1. C. *Bursa Pastoris* (*Shepherd's Purse*). An annual. Leaves spreading next the root, variously lobed and cut, tapering to the base, the upper ones sagittate. —— *Common everywhere in waste places.*

### Erophila.

Calyx equal at the base. Petals 2-lobed. Stamens not toothed. Silicle oval or oblong, with flat valves and a sessile stigma. Seeds numerous, bordered, in two rows. Flowers small, white.

1. E. *vulgaris*. A very small annual. Stem leafless, smooth at the upper part. Radical leaves lanceolate, acute, tapering to the base. ——— *Everywhere on old walls, early in the Spring.*

§ 3. Siliquosæ. *Fruit a silique, that is, longer than broad.*

### Brassica.

Sepals quite erect. Petals obovate. Silique taper, with scarcely any style. Seeds globose, in one row.

1. B. *oleracea* (*Cabbage*). Leaves fleshy, glaucous, waved, lobed, partly lyrate, all quite smooth. Flowers pale yellow. ——— *Common in gardens.*

2. B. *Napus* (*Turnip*). Root spindle-shaped. Leaves bright green and hairy; upper ones lanceolate, heart-shaped

at their base, clasping the stem; lower ones lyrate, toothed. Flowers bright yellow.——— *Common in fields.*

### Sinapis.

Calyx spreading. Petals obovate. Silique rather taper; valves ribbed. Style small, short, acute. Seeds in one row, roundish. Flowers yellow.

1. S. *arvensis* (*Charlock*). Pods with many angles, rugged, longer than their own awl-shaped beak. Leaves toothed; partly lyrate, or hastate. ——— *Common in corn fields.*

2. S. *alba* (*White Mustard*). Pods bristly, rugged, spreading, shorter than their own flat two-edged beak. Leaves lyrate.——— *Gardens and waste places.*

### Nasturtium.

Calyx spreading, equal. Petals entire. Silique nearly taper, shortened, or declinate. Stigma almost 2-lobed. Seeds small, irregularly attached in two rows, not bordered.

1. N. *officinale* (*Watercress*). Leaves pinnate; leaflets roundish-heart-shaped, ovate, wavy, a little lobed, rather succulent. Flowers white, in short erect racemes. ——— *Common in ditches.*

2. N. *amphibium.* Leaves oblong, pinnatifid or serrated. Roots fibrous. Petals longer than the calyx, yellow. Pod elliptical.——— *Common in wet places.*

### Arabis.

Calyx erect. Petals obovate or oblong. Silique linear; valves flat, with a single rib in the middle. Seeds in one row in each cell, oval or orbicular, compressed. Flowers white, unfrequently pink.

1. A. *alpina.* Lower leaves oblong obovate, upper ovate, deeply cordate, amplexicaul. Stems covered with stellate hairs. Flowers large, white. Seeds a little bordered.——— *Gardens, common.*

2. A. *Thaliana.* Leaves hairy, more or less toothed; radical ones stalked, oblong. Stamens not much shorter than the petals. Stem branched. Pod pointing upwards. ——— *In fields. An annual. Flowers small, white.*

### Cardamine.

Calyx equal at the base. Petals entire. Silique linear; valves flat, nerveless, usually dehiscing with elasticity. Seeds ovate, not bordered; umbilical cords slender.

1. C. *pratensis.* Leaves pinnate, without stipules; leaf-

lets of the radical ones roundish and toothed; those of the stem-leaves lanceolate, entire. Petals with a tooth upon the claw.——*Meadows and wet ditches. Flowers white, or very pale purple.*

ALLIARIA.

Calyx equal at the base, lax, deciduous. Four hypogynous glands. Silique nearly taper, somewhat 4-cornered, in consequence of its projecting ribs. Seeds rather cylindrical.

1. A. *officinalis* (*Jack by the Hedge*). Leaves cordate. Pods prismatical, much longer than the pedicels.—— *Hedgerows. Smells strongly of garlic.*

CHEIRANTHUS.

Calyx with two sacs at the base. Silique taper or compressed. Stigma 2-lobed or capitate. Seeds in one row, ovate, compressed.

1. C. *Cheiri* (*Wallflower*). Leaves lanceolate, acute, with simple close hairs, more hoary beneath. Stem shrubby. Branches angular. Style prominent. —— *Old walls and gardens. Flowers orange coloured, very fragrant.*

## VII. CISTACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 5, persistent, unequal, two external, and sometimes wanting, the three inner with a twisted æstivation. *Petals* 5, hypogynous, very fugitive, crumpled in æstivation, and twisted in a direction contrary to that of the sepals. *Stamens* indefinite, hypogynous, distinct; *anthers* innate. *Ovary* 1- or many-celled; *style* single; *stigma* simple. *Fruit* capsular, usually 3- or 5-valved, occasionally 10-valved, imperfectly 5- or 10-celled with dissepiments proceeding from the middle of the valves. *Seeds* indefinite in number. — *Shrubs* or *herbaceous* plants. *Branches* often viscid. *Leaves* usually entire, opposite or alternate, stipulate or exstipulate. *Racemes* usually unilateral. *Flowers* white, yellow, or red, very fugacious.

*** The plants of this order are more like Papaveraceæ than any others; but they are readily known by their permanent calyx, two of whose sepals are on the outside of the other 3, or wholly absent.

### Cistus.

Capsule 5-10-valved, with the valves having the dissepiments in the middle.

1. C. *salvifolius.* Leaves round at the base, ovate, obtuse, rough with hairs, rather hoary underneath. Peduncles solitary, one or two flowered, or somewhat umbellate. Stigma subsessile. ——— *South of Europe. Gardens.*

2. C. *cyprius* (*fig.* 50.) (*Gum Cistus*). Leaves subsessile, connate at the base, linear-lanceolate, smooth and often viscid above, downy beneath. Flowers large, white, with a bright purple spot at the base of each petal. ——— *South of Europe. Gardens.*

*Fig.* 50.

### Helianthemum.

Capsule 3-valved; with only a slight dissepiment in the middle of the valves.

1. H. *vulgare.* A small trailing undershrub. Leaves oval or linear, oblong, ciliated, hairy or downy, revolute at the edge, with stipules. Style 2 or 3 times as long as the ovary. Inner sepals obtuse, mucronulate. ——— *Chalky downs. Common in gardens.*

## VIII. VIOLACEÆ.

Essential Character. — *Sepals* 5, persistent. *Petals* 5, hypogynous, unequal. *Stamens* 5, alternate with the petals, often unequal; *anthers* bilocular, bursting inwards, either separate or cohering, and lying close upon the ovary; *filaments* dilated, elongated beyond the anthers; two generally furnished with an appendage or gland at their base. *Ovary* 1-celled, many-seeded, with 3 parietal placentæ; *style* single, usually declinate, with an oblique hooded *stigma.* *Capsule* of 3 valves, bearing the placentæ in their axis. *Herbaceous* plants. *Leaves* simple, alternate, stipulate.

*** The permanent calyx, irregular flowers, and

anthers, and 3 parietal placentæ in the middle of the same number of valves, readily distinguish this order among European plants.

VIOLA.

Sepals unequal, auricled. Petals unequal, the lower spurred. Stamens on the apex of a 5-toothed torus; two lower anthers with processes at their back. Capsule 3-valved, opening with elasticity.

1. V. *canina* (*Dog Violet*). Stem at length ascending, channelled. Leaves oblong, heart-shaped. Calyx acute Stipules serrated. Bracteas awl-shaped, entire. Flowers scentless. ——— *Groves, woods, and hedgerows.*

2. V. *odorata* (*Sweet Violet*). Stem none, producing runners. Leaves heart-shaped, nearly smooth, as well as their footstalks. Sepals obtuse. Lateral petals with a hairy central line. Flowers sweet-scented. ——— *Groves, woods, and hedgerows.*

3. V. *tricolor* (*Heart's-ease, or Pansy*). Stem angular, diffuse, divided. Leaves oblong, deeply crenate. Stipules lyrate, pinnatifid. Bracteas obsolete. ——— *Corn fields.*

## IX. DROSERACEÆ.

ESSENTIAL CHARACTER.— *Sepals* 5, persistent, equal. *Petals* 5, hypogynous. *Stamens* distinct, withering, equal in number to the petals and alternate with them. *Ovary* single; *styles* 3-5. *Capsule* of 3 or 5 valves, which bear the placentæ in the middle. —Delicate *herbaceous* plants, often covered with glands. *Leaves* alternate, with *stipulary* fringes and a circinate vernation. *Peduncles,* when young, circinate.

*** When the young leaves and flower stems first begin to grow in the spring, they are curled inwards like the head of a pastoral crook: a mark by which this order may be always known. Afterwards, they are liable to be confounded with Violaceæ, because of their 5 hypogynous stamens, and 3 parietal placentæ; they are, however, distinctly separated from that order by their regular flowers and disunited stamens.

DROSERA.

Sepals and petals 5, without appendages. Stamens 5. Styles 3-5, divided in two. Glandular herbaceous plants.

1. D. *rotundifolia* (*Sundew*). Leaves fringed with long red glandular hairs, depressed, growing in a circle, nearly orbicular, on hairy foot-stalks. Flower-stalks radical, racemose. Flowers white. ——— *Bogs.*

## X. POLYGALACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 5, very irregular, distinct, 2 interior (*the wings*) petaloid. *Petals* hypogynous, 3; of which 1 is anterior and larger than the rest (*the keel*), and 2 alternate with the upper outer, and lateral inner sepals, and often connate with the keel. *Keel* sometimes entire, and then either naked or crested; sometimes 3-lobed, and then destitute of a crest. *Stamens* hypogynous, 8, usually combined in a tube, unequal, and ascending; *anthers* 1-celled and opening at their apex. *Ovary* superior, compressed, with 2 or 3 cells, which are anterior and posterior, the upper one occasionally suppressed; *ovules* solitary, very rarely twin, pendulous; *style* simple, curved, sometimes very oblique and cucullate at the apex, which is also entire or lobed; *stigma* simple. *Fruit* usually opening through the valves; occasionally indehiscent. *Seeds* pendulous, with a caruncula next the hilum. — *Shrubs* or *herbaceous* plants. *Leaves* generally alternate, sometimes opposite, mostly simple, and always destitute of *stipules*. *Flowers* usually racemose, very often small and inconspicuous, but showy in many Polygalas. *Pedicels* with 3 bracts.

*** The student must be careful not to mistake a Polygala for a Fabaceous or Leguminous plant, because of its having two wings to the flower. In Polygalaceæ, the wings belong to the calyx, in Fabaceæ to the corolla.

POLYGALA.

Sepals persistent, the two inner wing-shaped. Petals 3-5, adhering to the tube of the stamens; the lower carinate.

Capsule compressed, elliptical, obovate, or obcordate. Seeds downy, without a coma, with a carunculate hilum.

1. P. *vulgaris* (*Milkwort*). Flowers crested. Bracts 3, at the base of each flower-stalk, deciduous. Wings about equal to the corolla. Stems ascending, simple, herbaceous. Leaves linear-lanceolate. ——— *Chalky downs and on heaths.*

## XI. CARYOPHYLLEÆ.

Essential Character. — *Sepals* 5, tubular or disunited. *Petals* 5, entire or slit. *Stamens* twice as many as the petals, but many often imperfect, hypogynous. *Ovary* 1-celled, with a free central placenta, bearing many ovules. *Styles* several, fruit 1-celled, capsular, in most cases opening by teeth or valves. — *Herbaceous* plants, with opposite narrow entire leaves and tumid nodes.

*** There are no other Exogens with polypetalous flowers, opposite undivided leaves without stipules, and stems tumid at the nodes.

### § 1. Sileneæ. *Calyx tubular.*

#### Dianthus.

Calyx tubular, 5-toothed, with from 2 to 4 opposite imbricated bracts at the base. Petals 5, with long claws. Stamens 10. Stigmata 2. Capsule 1-celled. Seeds compressed, convex on one side, concave on the other, peltate. Embryo nearly straight.

1. D. *barbatus* (*Sweet William*). Flowers in heads. Bracts herbaceous, ovate, with a subulate awn as long as the calyx, the outermost reflexed. Leaves lanceolate, on short stalks. ——— *Gardens. Alps of Europe.*

2. D. *Caryophyllus* (*Common Pink*). Flowers very sweet-scented, solitary. Bracts almost rhomboid, very short. Petals notched, beardless. Leaves very glaucous, smooth at the edge, scabrous at the base. ——— *Old walls. Common in gardens.*

#### Silene.

Calyx tubular, 5-toothed, naked. Petals 5, unguiculate, generally having scales at the throat, with a bifid limb. Stamens 10. Stigmas 3. Capsules 3-celled at the base, dehiscing at the apex with 6 teeth.

1. S. *Armeria* (*Lobel's Catchfly*). Flowers aggregate, tufted. Bracts lanceolate, downy, as long as the calyx. Petals serrated. Leaves very narrow, rather blunt. ——— *A common annual in gardens.*

### Lychnis.

Calyx tubular, 5-toothed, naked. Petals 5, unguiculate, usually with scales at the throat. Stamens 10. Stigmas 5. Capsule 1-5-celled.

1. L. *Flos Cuculi* (*Ragged Robin*). Leaves linear-lanceolate. Petals in four linear segments. Capsule roundish, of one cell. Stem rough with deflexed bristles. ——— *Common by waysides.*

2. L. *vespertina* (*Bachelor's Buttons*). Petals ½ bifid, with an appendage. Stem villous beneath. Upper leaves ovate-lanceolate, tapering to a point, with the peduncles and calyx covered with glandular hairs. Capsule ovate, conical, with straight teeth. Flowers dicœcious. ——— *Common by roadsides. Flowers white, opening in the evening, sweet-scented.*

3. L. *diurna*. Petals ½ bifid, with an appendage. Stem, leaves, peduncles, and calyxes villous, with simple hairs. The upper leaves ovate, suddenly acuminate. Capsule roundish-ovate, with revolute teeth. Flowers dicœcious. ——— *Common by roadsides. Flowers purple, open all day long, scentless.*

## § 2. Alsineæ. *Calyx divided into five leaves.*

### Spergula.

Calyx 5-parted. Petals 5, entire. Stamens 5-10. Stigmas 5. Capsule of one cell, 6 valves, and many seeds.

1. S. *arvensis* (*Spurrey*). Leaves whorled, linear-subulate. Stalks, when in fruit, reflexed. Seeds globose, roughish, with a narrow wing. ——— *Corn fields.*

### Alsine.

Sepals 5, rarely 4. Petals 5, rarely 4, entire, or slightly emarginate. Stamens 10, or fewer; all the filaments subulate. Ovary with many ovules. Styles 3. Capsule 3-valved.

1. A. *rubra*. Leaves linear-filiform, mucronate, somewhat fleshy, flat on each side, with stipules. Stems prostrate and ascending, branched. Branches racemose. Peduncles bent back after flowering. Sepals lanceolate, obtuse, nerveless, membranous at the edge. Seeds wingless. ——— *Waste gravelly places.*

ARENARIA.

Sepals 5. Petals 5, entire. Stamens 10, some of which are occasionally abortive. Stigmas 3. Capsule 1-celled, with 3 or 6 teeth at the apex, and many seeds.

1. A. *serpyllifolia.* Leaves ovate, nearly sessile, rough. Sepals hairy; three outermost 5-ribbed, half as long again as the corolla. Petals oval. ——— *Fields, old walls, and barren places.*

STELLARIA.

Calyx 5-parted. Petals 5, bifid. Stamens 10, or by abortion 3-8. Stigmas 3. Capsule of one cell, 6 teeth at the apex, and many seeds.

1. S. *nemorum.* Lower leaves heart-shaped, stalked; upper ovate, sessile. Panicle repeatedly forked. Stem ascending, villous upwards. ——— *Shady woods and damp places.*

2. S. *media* (*Chickweed*). Leaves ovate, the upper sessile. Stems procumbent, with a hairy alternate line on one side. Stamens from 3 to 10. Petals as long as the calyx, or shorter. ——— *Everywhere, in waste places.*

3. S. *graminea.* Leaves linear-lanceolate, entire, ciliated at the base. Panicle terminal, spreading. Sepals 3-ribbed, nearly as long as the petals. Stem quadrangular, smooth. Capsule oblong. ——— *Damp ditches, common.*

4. S. *Holostea.* Leaves lanceolate, taper pointed, finely serrated. Petals inversely heart-shaped. Sepals without ribs. Stem quadrangular. Capsule globose. ——— *Damp ditches.*

CERASTIUM.

Calyx 5-parted. Petals 5, bifid. Stamens 10. Stigmas 5. Capsule 1-celled, cylindrical or globose, with 10 teeth at the point.

1. C. *vulgatum.* Hairy, pale green. Leaves roundish-ovate, very blunt. Flowers in dense dichotomous panicles. Petals linear, with two teeth, scarcely longer than the calyx. Capsules ascending, oblong, about twice as long as the calyx; with subulate teeth. ——— *A common weed.*

## XII. LINACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 5, imbricated. *Petals* equal in number to the sepals, hypogynous, unguiculate, with a twisted æstivation. *Stamens* equal in number to the petals, and alternate with them, united

at the base in a hypogynous ring, from which proceed little teeth opposite to the petals, and indicating abortive stamens; *anthers* ovate, innate. *Ovary* with about as many cells as sepals, seldom fewer; *styles* equal in number to the cells; *stigmas* capitate. *Capsule* generally pointed with the indurated base of the styles, many-celled; each cell partially divided into two by an imperfect spurious dissepiment, and dehiscing with two valves at the apex. *Seeds* in each cell single, compressed, inverted. — *Herbaceous* plants, or small *shrubs*. *Leaves* entire, without stipules, usually alternate. *Petals* fugitive.

Fig. 51.

LINUM.

Parts of the flower quinary. Sepals entire. Styles very seldom 3.

1. L. *usitatissimum* (*fig.* 51.) (*Flax*). Sepals ovate, acute, ciliated, not glandular, as long as the calyx. Petals crenate, blue. Leaves lanceolate, alternate. Stems mostly solitary, quite erect. ——— *Common cultivated.* Flowers large, blue, with very deciduous petals. An annual.

2. L. *perenne*. Sepals ovate, smooth, not glandular, shorter than the calyx, the inner very obtuse. Leaves linear-lanceolate, smooth. Stems numerous. Stalks of the fruit quite erect. ——— *Germany.* Flowers large, blue, with very deciduous petals. A perennial.

## XIII. MALVACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 5, with a valvate æstivation, often bearing external bracts forming an involucre. *Petals* of the same number as the sepals, hypogynous, with a twisted æstivation, either distinct or adhering to the tube of the stamens. *Stamens* indefinite, hypogynous; *filaments* monadelphous; *anthers* 1-celled, reniform, bursting transversely. *Ovary* formed by the union of several carpels round a common

axis; *styles* the same number as the carpels, united. *Fruit* capsular, its carpels monospermous, sometimes united in one, sometimes separate or separable; dehiscence either loculicidal or septicidal. *Seeds* sometimes hairy. — *Herbaceous* plants, *trees*, or *shrubs*. *Leaves* alternate, more or less divided, stipulate. *Hairs* stellate. *Peduncles* usually axillary.

### Malva.

Calyx surrounded by an involucrum, formed generally of 3 leaves, seldom of 5 or 6. Bracteolæ oblong or setaceous. Fruit composed of numerous achænia, arranged in a circle round a convex centre.

1. M. *sylvestris* (*Common Mallow*). Stem upright, herbaceous. Leaves with 7 acute lobes. Foot-stalks and flower-stalks hairy. ——— *Waysides*. Flowers large, purple, striped.

2. M. *rotundifolia* (*Small-flowered Mallow*). Stems prostrate. Leaves roundish-heart-shaped, bluntly 5-lobed. Stalks, when in fruit, bent downwards. ——— *Waysides*. Flowers small, pale purple.

### Althæa.

Calyx surrounded by an involucrum, having from 6 to 9 divisions. Achænia collected into a circle, as in Malva.

1. A. *officinalis* (*Marsh Mallow*). Leaves simple, very soft and downy, cordate or ovate, the lower 5-lobed, the upper 3-lobed. ——— *Meadows*. Stem 3 or 4 feet high. Flowers very pale lilac.

### Lavatera.

Calyx surrounded by an involucrum of 3 leaves. Fruit as in the genus Malva.

1. L. *trimestris*. Stem herbaceous. Leaves nearly smooth, roundish-cordate, the upper angular. Pedicels solitary. The achænia covered by an expansion of the central axis. ——— *South of France*. A common garden annual.

### Hibiscus.

Calyx surrounded by an involucrum of numerous leaflets. Stigmas 5. Capsule 5-celled, many-seeded.

1. H. *syriacus* (*Althæa frutex*). Stem bushy, woody. Leaves wedge-shaped, ovate, three-lobed, toothed. Pedicels scarcely longer than the petiole. Leaflets of the involucrum 6-7. ——— *Carniola*. A common shrub in gardens.

## XIV. TILIACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 4 or 5, with a valvular æstivation. *Petals* 4 or 5, entire. *Stamens* indefinite, hypogynous, distinct; *anthers* 2-celled, dehiscing longitudinally. *Ovary* single, composed of from 4 to 10 carpels; *style* one; *stigmas* as many as the carpels. *Fruit* dry, of several cells. — *Trees* or *shrubs*. *Leaves* simple, stipulate, toothed, alternate. *Flowers* axillary.

*** The valvate æstivation of the calyx brings these plants near Malvaceæ, from which they are immediately known by their stamens being distinct, with 2-celled anthers.

### TILIA.

Calyx 5-parted, deciduous. Petals 5, with or without a scale on the inside. Stamens numerous, with distinct or somewhat polyadelphous filaments. Ovarium with one style, and 5 2-seeded cells. Fruit, by abortion, 1-celled, with 1 or 2 seeds. — Trees, with a bark separating into distinct layers; and light wood.

1. T. *europæa* (*Lime Tree*). Leaves twice the length of the foot-stalks, quite smooth, except a woolly tuft at the origin of each vein beneath. Cymes many-flowered. Fruit coriaceous, downy. ——— *A common tree in woods.* Flowers yellowish, sweet-scented.

2. T. *parvifolia*. (*fig.* 52.) Leaves smooth above, glaucous beneath, with scattered as well as axillary hairy blotches. Umbels compound, many-flowered. Fruit roundish, brittle, nearly smooth. ——— *A tree common in woods.* Flowers yellowish, very sweet.

*Fig.* 52.

## XV. HYPERICACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 4-5, distinct, persistent, unequal, with glandular dots. *Petals* 4-5, hypogynous, with a twisted æstivation and oblique vernation, often having black dots. *Stamens* indefinite, hypogynous, in three or more parcels; *anthers* versatile. *Ovary* single, superior; *placenta* at this time central; *styles* several, rarely connate; *stigmas* simple, occasionally capitate. *Fruit* a capsule or berry, of many valves and many cells; the edges of the former being curved inwards. — *Herbaceous* plants, *shrubs*, or *trees*, with a resinous juice. *Leaves* opposite, entire, sometimes dotted, occasionally alternate and crenelled. *Flowers* generally yellow. *Inflorescence* variable.

*** The polyadelphous stamens and dotted petals mark this order.

### ANDROSÆMUM.

Capsule berried, almost one-celled. Calyx divided into 5 pieces of unequal size. Petals 5. Styles 3. Stamens many, united at the base.

1. A. *officinale.* A shrub. Leaves sessile. Flowers terminal, stalked. ——— *Woods and hedges.*

### HYPERICUM.

Capsule membranous. Styles 3-5, sometimes variable in number. Stamens numerous, polyadelphous, occasionally reduced to almost a definite number. Petals 5. Sepals 5, more or less united at the base. —Herbaceous plants or shrubs. Leaves opposite, often with pellucid dots or black dots at the margin.

1. H. *perforatum.* Styles 3. Stem two-edged. Leaves obtuse, with copious pellucid dots. Segments of the calyx lanceolate. ——— *Woods and hedges, common.*

2. H. *humifusum.* Styles 3. Flowers somewhat cymose. Stem compressed, prostrate. Leaves elliptical, smooth. Segments of the calyx ovate, leafy. ——— *Heaths and bogs.*

3. H. *quadrangulare.* Styles 3. Stem herbaceous, with four winged angles. Leaves oval, with copious pellucid dots. Segments of the calyx lanceolate acuminate, entire. ——— *Ditches and wet places.*

4. H. *pulchrum*. Styles 3. Calyx ovate, with glandular serratures. Stem erect, round. Leaves clasping the stem, heart-shaped, smooth. ——— *Woods and heaths.*

## XVI. ACERACEÆ.

ESSENTIAL CHARACTER. — *Calyx* divided into 5, or occasionally from 4 to 9 parts, with an imbricated æstivation. *Petals* equal in number to the lobes of the calyx, inserted round a hypogynous disk. *Stamens* inserted upon a hypogynous disk, generally 8. *Ovary* 2-lobed; *style* 1; *stigmas* 2. *Fruit* formed of two parts, which are indehiscent and samaroid; each 1-celled, with 1 or 2 seeds.— *Trees*. *Leaves* opposite, simple, rarely pinnate, without stipules. *Flowers* often polygamous, sometimes apetalous, in axillary corymbs or racemes.

ACER.

Flowers polygamous. Calyx of 5 lobes or parts. Stamens seldom 5, generally 7 or 9. — Leaves simple.

1. A. *Pseudoplatanus* (*The Sycamore Tree*). Leaves palmate, 5-lobed, glaucous beneath, unequally serrated, with acuminate lobes. Racemes long, pendulous. ——— *Woods*. A large tree.

2. A. *campestre* (*The Maple Tree*). Leaves palmate, 5-lobed, obtuse, somewhat cut. Corymbs erect. ——— *Woods and hedges*. A small tree, or bush, often with corky bark.

## XVII. GERANIACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 5, persistent, ribbed, with an imbricated æstivation. *Petals* 5, hypogynous. *Stamens* usually monadelphous, hypogynous, twice or thrice as many as the petals. *Ovary* composed of 5 pieces placed round an elevated axis, each 1-celled, 1-seeded; *styles* 5, cohering round the elongated axis. *Fruit* formed of 5 pieces, cohering round a lengthened indurated axis; each piece consisting of 1 cell, containing 1 seed, having a membranous pericarp, and terminated by an indurated style, which finally curls

back from the base upwards, carrying the pericarp along with it. *Seeds* solitary, pendulous.—*Herbaceous* plants or *shrubs*. *Stems* tumid, and separable at the joints. *Leaves* either opposite or alternate; in the latter case opposite the peduncles; often stipulate.

*** The long beak to the fruit is a peculiar feature of the plants of this order.

### Geranium.

Sepals 5, equal. Petals 5, equal. Stamens 10, fertile, alternately larger. Nectariferous glands at the base of the larger stamens. Indurated styles glabrous internally, curling back from the axis, from the base to the point. Herbaceous plants with palmate lobed leaves, and 1- or 2-flowered peduncles.

1. G. *pyrenaicum*. Stalks 2-flowered. Petals twice the length of the calyx. Leaves kidney-shaped, lobed. Fruits keeled, even, somewhat downy. Seeds without dots. ——— *Meadows, common in many places.* Flowers small, purple.

2. G. *dissectum*. Stalks 2-flowered. Petals cloven, shorter than the sepals. Leaves in 5 deep laciniated segments. Fruit hairy. Seeds reticulated. ——— *Fields and hedgerows, common.* Flowers pale purple.

3. G. *molle*. Stalks 2-flowered, alternate, opposite to the leaves, which are rounded, many-lobed, notched, and downy. Petals emarginate. Fruit much wrinkled, smooth. Seeds without dots. ——— *Waste places, common.* Flowers small, purple.

4. G. *rotundifolium*. Stalks 2-flowered. Petals entire. Leaves kidney-shaped, cut, downy. Fruit even, hairy. Seeds reticulated. ——— *Waste places.*

5. G. *lucidum*. Stalks 2-flowered. Leaves 5-lobed, rounded. Calyx pyramidal, transversely wrinkled. Fruit wrinkled, triply keeled. ——— *Rocks and walls.* Leaves and stems very shining, usually stained bright red.

6. *G. Robertianum* (*Herb Robert*). Stalks 2-flowered. Leaves somewhat pedate, pinnatifid, 5-angled. Calyx with 10 angles. Fruit wrinkled, simply keeled. ——— *Hedgerows, fields, and waste places.* Whole plant, with a strong disagreeable smell.

### Erodium.

Sepals 5, equal, not extended into a nectariferous tube. Petals 5, regular or irregular. Stamens 10, monadelphous, of which 5 are sterile. Glands at the base of the sterile

stamens. Styles indurated, bearded internally, twisted spirally when ripe. — Herbaceous plants or undershrubs, with lobed leaves, and peduncles usually bearing several flowers.

1. *E. cicutarium.* Stems procumbent, hairy. Stalks many-flowered. Leaves pinnate; leaflets sessile, pinnatifid, cut. Stamens simple. ——— *Waste places.* A common annual.

## XVIII. OXALIDACEÆ.

Essential Character. — *Sepals* 5, sometimes slightly cohering at the base, persistent, equal. *Petals* 5, hypogynous, equal, unguiculate, with a spirally twisted æstivation. *Stamens* 10, usually more or less monadelphous, those opposite the petals forming an inner series, and longer than the others; *anthers* 2-celled, innate. *Ovary* with 5 angles and 5 cells; *styles* 5, filiform; *stigmas* capitate or somewhat bifid. *Fruit* capsular, membranous, with 5 cells, and from 5 to 10 valves. *Seeds* few, fixed to the axis, enclosed within a fleshy integument, which curls back at the maturity of the fruit, and expels the seeds with elasticity.—*Herbaceous* plants, *undershrubs,* or *trees. Leaves* alternate, compound, sometimes simple by abortion, very seldom opposite or somewhat whorled.

### Oxalis.

Sepals 5, distinct, or united at the base. Petals 5. Stamens 10; filaments slightly monadelphous; the 5 exterior alternately shorter. Styles 5. Stigmata pedicelled or capitate. Capsule 5-cornered, oblong or cylindrical.

1. *O. Acetosella* (*Wood Sorrel*). Stalks radical, single-flowered. Leaves ternate, inversely heart-shaped, hairy. Root of many scaly joints. Stamens all simple. — *Woods.* Flowers small, whitish, with pale purple veins.

## XIX. RUTACEÆ.

Essential Character. — *Flowers* hermaphrodite, regular or irregular. *Calyx* in 4 or 5 divisions. *Petals* as many as the divisions of the calyx. *Stamens* equal in number to the petals, or twice or thrice as many, or even fewer, hypogynous, placed on the outside

of a disk or cup surrounding the ovary. *Ovary* sessile or stalked, its lobes equal to the number of petals, or fewer; *ovules* twin and collateral, or one above the other; *style* single; *stigma* simple or dilated. *Fruit* consisting of several capsules, either cohering firmly or more or less distinct. *Seeds* twin or solitary, with a testaceous integument. — *Trees, shrubs,* or *herbaceous* plants. *Leaves* without stipules, opposite or alternate, simple or pinnated, filled with transparent dots.

RUTA.

Calyx permanent, usually 4-parted. Petals usually 4, unguiculate, concave. Stamens 8, straight, inserted on a disk below the ovary. As many honey pores in the disk as there are stamens. Ovary 4-lobed.

1. R. *graveolens* (*Rue*). Leaves usually tripinnate, with oval and obovate leaflets. Petals toothed. Lobes of the capsule blunt. ——— *Common in gardens.* Whole plant with a strong oppressive smell. Flowers dingy greenish-yellow.

DICTAMNUS.

Calyx deciduous, 5-parted. Petals 5, unguiculate, rather unequal. Stamens 10, declinate. Ovary raised upon a short disk.

1. D. *Fraxinella* (*Fraxinella*). Leaves pinnated; leaflets oblong, serrated. Petals acute, veiny. ——— *Swiss mountains. Common in gardens.* Whole plant very fragrant. Flowers white or purple.

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In addition to the preceding orders are the following, which are of much less importance, but which contain European species.

## CAPPARIDACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 4, either nearly distinct, or cohering in a tube. *Petals* 4, cruciate. *Stamens* almost perigynous, indefinite. *Disk* hemispherical, or elongated, often bearing glands. *Ovary* stalked; *style* none, or filiform. *Fruit* either podshaped and dehiscent, or baccate, 1-celled, with 2 polyspermous placentæ. *Seeds* generally reniform, without albumen. — *Herbaceous* plants, *shrubs,* or *trees,* without true

stipules, but sometimes with spines in their place. *Leaves* alternate, stalked, undivided, or palmate.

*** *Capparis spinosa* (*the common Caper*), a plant inhabiting rocky places in the South of Europe, is the only European species of this order, which is chiefly tropical.

## FRANKENIACEÆ.

Essential Character. — *Sepals* 4-5, in a furrowed tube. *Petals* hypogynous, unguiculate. *Stamens* hypogynous, either equal in number to the petals, or having a tendency to double the number; *anthers* roundish, versatile. *Ovary* superior; *style* filiform, 2-fid or 3-fid. *Capsule* 1-celled, enclosed in the calyx, 2- 3- or 4-valved, many-seeded. *Seeds* attached to the margins of the valves, very minute. — *Herbaceous* plants or *under-shrubs*. *Leaves* opposite, extipulate, with a membranous sheathing base. *Flowers* sessile in the divisions of the branches, usually pink.

*** Little obscure plants, usually inhabiting the neighbourhood of the sea, and of no importance to man.

## TAMARICACEÆ.

Essential Character. — *Calyx* 4- or 5-parted, persistent, with an imbricated æstivation. *Petals* withering, imbricated. *Stamens* equal to the petals in number, or twice as many, distinct or monadelphous. *Ovary* superior; *style* very short; *stigmas* 3. *Capsule* 3-valved, 1-celled, many-seeded; *placentæ* 3, either at the base of the cavity, or along the middle of the valves. *Seeds* erect or ascending, comose. — *Shrubs* or *herbs*, with rod-like branches. *Leaves* alternate, resembling scales, entire. *Flowers* in close spikes or racemes.

*** *Tamarix gallica* (the *French Tamarisk*) and *Myricaria germanica* (the *German Tamarisk*) are commonly cultivated as shrubs. The former becomes a tree in warmer latitudes, and in the East exudes a kind of manna: the latter has been found wild in England.

## ELATINACEÆ.

Essential Character. — *Sepals* 3-5, distinct, or slightly connate. *Petals* alternate with the sepals. *Stamens* usually twice as numerous as the petals. *Ovary* with from 3 to 5 cells, an equal number of styles, and capitate stigmas. *Fruit*

capsular, 3-5-celled, with the valves alternate with the septa. *Seeds* numerous. — *Annuals*, found in marshy places. *Stems* fistular, rooting. *Leaves* opposite, with stipules.

*** Minute weeds, of rare occurrence, and of no importance.

## ZYGOPHYLLACEÆ.

Essential Character. — *Flowers* hermaphrodite, regular. *Calyx* of 4 or 5 pieces, convolute. *Petals* unguiculate. *Stamens* double the number of the petals, dilated at the base, sometimes placed on the back of a small scale. *Ovary* surrounded at the base with glands or a short sinuous disk, more or less furrowed, with 4 or 5 cells; *ovules* in each cell 2 or more; *style* simple, usually with 4 or 5 furrows; *stigma* simple, or with 4 or 5 lobes. *Fruit* capsular, rarely somewhat fleshy, with 4 or 5 angles or wings. — *Herbaceous* plants, *shrubs*, or *trees*, with membranous stipules between the opposite leaves. The branches are usually, when young, separable at the articulations.

*** A few species occur in the south-eastern parts of Europe; *Fagonia cretica* and *Zygophyllum Fabago* may be taken as types of the order, which approaches very nearly to Rutaceæ, differing in the leaves being opposite and having stipules, and not being dotted.

## CORIARIACEÆ.

Essential Character. — *Flowers* hermaphrodite, or unisexual. *Calyx* campanulate, 5-parted. *Petals* 5, fleshy, with an elevated keel in the inside. *Stamens* 10, arising from the torus, 5 between the lobes of the calyx and the angles of the ovary, 5 between the petals and the furrows of the ovary. *Ovary* seated on a thickish base, 5-celled, 5-angled; *stigmas* 5, long, subulate; carpels 5, when ripe close together but separate, indehiscent, 1-seeded. — *Shrubs*, with opposite branches. *Leaves* opposite or alternate, simple, entire. *Buds* scaly. *Racemes* terminal, and axillary.

*** One plant only, *Coriaria myrtifolia*, a Spanish species, is found in Europe. It is a common shrub in curious collections.

## CHAP. V.

### OF CALYCIFLORAL EXOGENS.

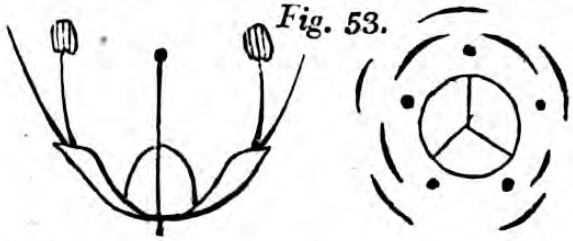
THERE are the following principal natural orders of this subclass in the Flora of Europe; namely,—

20. Celastraceæ; 21. Rhamnaceæ; 22. Leguminosæ, or Fabaceæ; 23. Rosaceæ; 24. Onagraceæ; 25. Lythraceæ; 26. Myrtaceæ; 27. Crassulaceæ; 28. Grossulaceæ; 29. Saxifragaceæ; 30. Umbelliferæ, or Apiaceæ.

Their differences are briefly expressed in the following characters: —

20. *Celastraceæ.*— Sepals imbricate, with the petals and stamens 4 or 5 each; the latter alternate with the

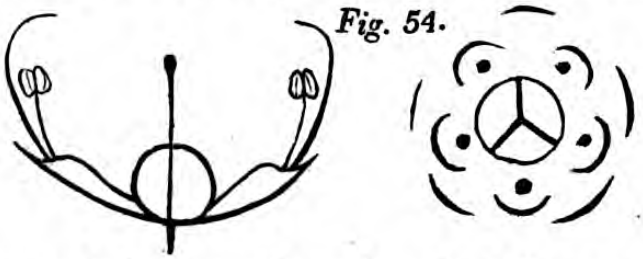
*Fig. 53.*



petals. Disk large and fleshy. Carpels united into a superior 3- or 4-celled pistil.

21. *Rhamnaceæ.* — Sepals valvate, with the petals and stamens 4 or 5 each; the latter opposite the petals.

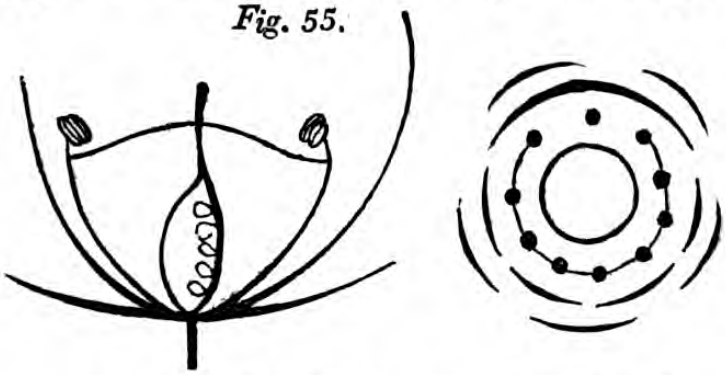
*Fig. 54.*



Disk large and fleshy. Carpels united into a superior 2- 3- or 4-celled pistil.

22. *Leguminosæ.* — Sepals and petals 5 each, the latter papilionaceous. Stamens 10, monadelphous or

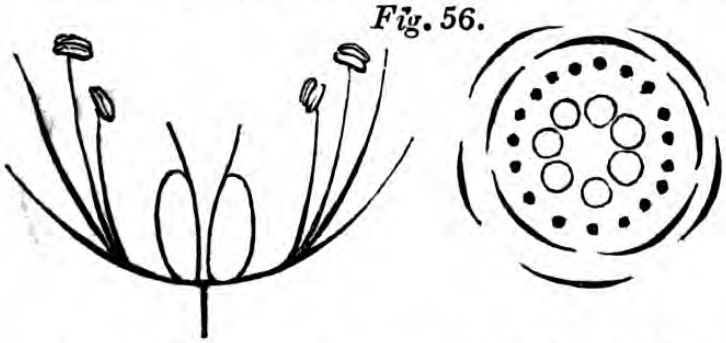
*Fig. 55.*



diadelphous. Carpel solitary, superior, ripening into a legume.

23. *Rosaceæ.* — Sepals and petals 4 or 5 each. Stamens indefinite. Carpels distinct, more or less su-

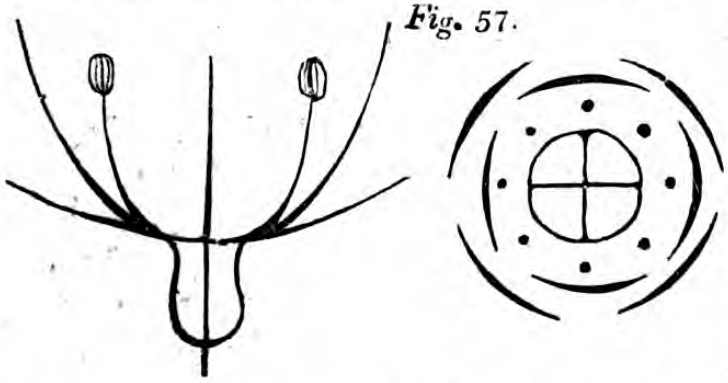
*Fig. 56.*



perior or inferior, ripening into a fruit which is not a legume.

24. *Onagraceæ.* — Sepals valvate, with the petals and

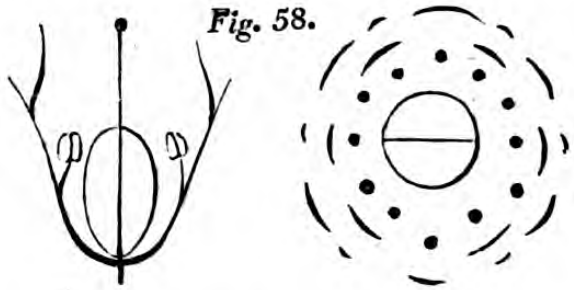
*Fig. 57.*



stamens some power of 2. Carpels 4 or 2, united into an inferior many-celled ovary.

25. *Lythraceæ.* — Calyx tubular, strongly striated, its sepals, as well as the stamens, uncertain in number.

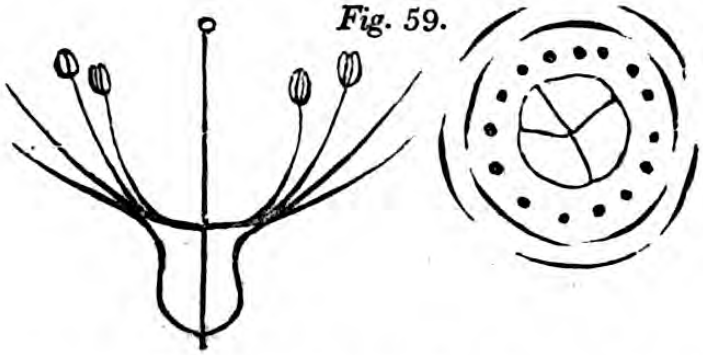
*Fig.* 58.



Petals crumpled, inserted into the upper part of the calyx, much above the stamens. Carpels 2 or 4, united in a superior many-celled ovary.

26. *Myrtaceæ.* — Sepals and petals 4 or 5 each, dotted. Stamens indefinite in number. Carpels united

*Fig.* 59.



into a many-celled inferior pistil, with a simple style and stigma.

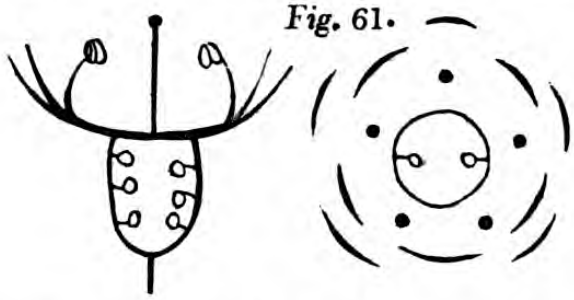
27. *Crassulaceæ.* — Sepals, petals, stamens, and car-

*Fig.* 60.

pels all distinct, and a power of 3, 4, 5, or 6. The carpels superior, opposite the petals, and many-seeded.

28. *Grossulaceæ.* — Sepals, petals, and stamens 5

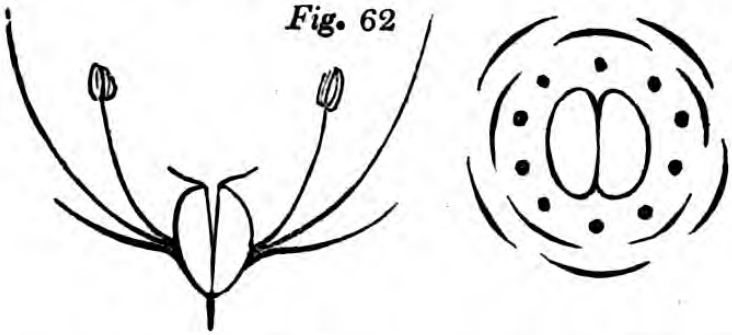
*Fig.* 61.



each. Carpels united into an inferior 1-celled pistil, with two parietal placentæ. Fruit a berry.

29. *Saxifragaceæ.*— Sepals, petals, and stamens $\frac{5}{\sqrt{}}$. Carpels united into a pistil, with 2 many-seeded cells

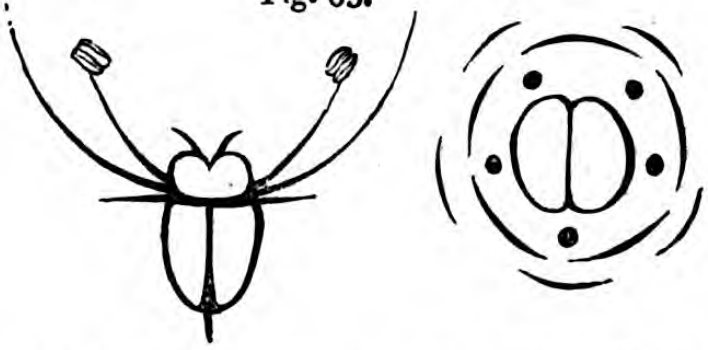
*Fig.* 62



and two diverging styles. Fruit a membranous capsule.

30. *Umbelliferæ,* or *Apiaceæ.* — Sepals, petals, and stamens 5 each. The latter inserted round a double epigynous disk. Carpels 2, united into an inferior

*Fig.* 63.



pistil with 2 cells, 2 ovules, and 2 styles. Fruit separating into 2 achænia. Flowers in umbels.

## Tabular View of the preceding Natural Orders.

A. *Stamens indefinite in number.*
  *a.* Carpels wholly or in part distinct from each other. Leaves not dotted - - *Rosaceæ.*
  *b.* Carpels wholly combined into one pistil. Leaves dotted - - - *Myrtaceæ.*

B. *Stamens definite in number.*
  *a.* Ovary more or less superior.
    α. Flowers papilionaceous - *Leguminosæ.*
    β. Flowers regular, with two many-seeded carpels, and divaricating styles in the fruit *Saxifragaceæ.*
    γ. Flowers regular, with the sepals, stamens, and carpels all distinct, and of the same power - - - *Crassulaceæ.*
    δ. Flowers regular, with a valvate calyx, stamens opposite the petals, and solitary erect ovules - - - *Rhamnaceæ.*
    ε. Flowers regular, with an imbricated calyx, stamens alternate with the petals, and a few erect ovules - - *Celastraceæ.*
    ζ. Flowers regular, with a tubular calyx, between whose lobes the petals are inserted far above the stamens - *Lythraceæ.*
  *b.* Ovary completely inferior.
    α. All the parts of the flower $\sqrt[2]{}$ *Onagraceæ.*
    β. Sepals, petals, and stamens 5 each, the latter inserted round a double fleshy epigynous disk. Fruit double, dry. Flowers in umbels - - - *Umbelliferæ.*
    γ. Sepals, petals, and stamens 5 each, the latter inserted on the calyx. Fruit a berry with parietal placentæ - *Grossulaceæ.*

The following is a detailed account of these orders, together with some of their commoner genera and species

## XX. CELASTRACEÆ.

ESSENTIAL CHARACTER.— *Sepals* 4 or 5, imbricated. *Petals* inserted by a broad base under the margin of the disk, with an imbricate æstivation. *Stamens* alternate with the petals, inserted into the disk. *Disk* large, expanded flat, closely surrounding the ovary. *Ovary* superior, immersed in the disk and adhering to it, with 3 or 4 cells; *cells* 1- or many-seeded. *Fruit* superior, with 3 or 4 septiferous valves. *Seeds* ascending, provided with an aril. — *Shrubs*. *Leaves* simple, alternate, or opposite. *Flowers* in axillary cymes.

*** These shrubby plants may be mistaken for Rhamnaceæ, unless attention is paid to their stamens, which are alternate with the petals. They cannot be confounded with Rosaceæ, because they have only 5 stamens; nor with Onagraceæ, because their parts are not regularly $\frac{4}{\sqrt{}}$.

### EUONYMUS.

Calyx 4-6-lobed, flat, with a peltate disk in the bottom. Petals 4-6, spreading, inserted in the disk. Stamens 4-6, inserted into glands projecting from the disk, alternate with the petals. Style 1. Capsule 3- or 5-celled, with 3 or 5 angles; dehiscence loculicidal. Seeds from 1 to 4, with a fleshy arillus. — Shrubs with square branches. Leaves generally opposite. Peduncles axillary.

*Fig.* 64.

1. E. *europæus* (*fig.* 64.) (*The Spindle Tree*). Flowers mostly 4-cleft. Petals acute. Branches smooth and even. Leaves elliptical-lanceolate, serrulated, smooth. Arillus red, enclosing the whole seed. ——— *Hedges and Shrubberies*. A deciduous shrub.

### STAPHYLEA.

Calyx 5-parted, with an urceolate disk. Petals 5. Ovarium 2- or 3-lobed. Styles 2 or 3, sometimes combined. Fruit membranous, of 2 or 3 cells, dehiscing internally. Seeds bony, roundish, truncate at the hilum. — Flowers large, white, in racemose panicles.

1. S. *pinnata* (*The Bladder Nut*). Leaves pinnate; leaflets 5-7, oblong-lanceolate, quite smooth, serrated. Flowers in racemes. ——— *Shrubberies.* A deciduous shrub.

## XXI. RHAMNACEÆ.

ESSENTIAL CHARACTER. — *Calyx* 4-5-cleft, with a valvate æstivation. *Petals* distinct, cucullate, or convolute, inserted into the orifice of the calyx, occasionally wanting. *Stamens* opposite the petals. *Disk* fleshy. *Ovary* superior, or half superior, 2- 3- or 4-celled. *Fruit* fleshy and indehiscent, with 2 or 3 erect seeds, or hard and dry.—*Trees* or *shrubs*, often spiny. *Leaves* simple, alternate, with minute *stipules*. *Flowers* axillary or terminal, small and inconspicuous.

*** The valvate æstivation of the calyx and the stamens opposite the petals, which stand over them like hoods, will enable the student to know the plants of this natural order. The petals, however, are sometimes absent.

### PALIURUS.

Calyx flat, 5-cleft, deciduous, except at the base, where it is cut round and permanent. Petals and stamens inserted in front of a fleshy disk. Fruit hard, dry, surrounded by an orbicular wing.

*Fig. 65.*

1. P. *aculeatus* (*fig. 65.*) (*Christ's Thorn*). Young twigs downy. Branches armed with hooked thorns. Leaves ovate, briefly acuminate, 3-ribbed. Wing of the fruit crenated. ——— *Shrubberies.*

### RHAMNUS.

Calyx urceolate, 4-5-cleft. Petals 0, or emarginate. Anthers ovate, 2-celled. Disk thin, overspreading the tube of the calyx. Ovarium superior, 3- or 4-celled. Styles 3 or 4, distinct or united. Fruit fleshy with 3 or 4 indehiscent stones.

1. R. *catharticus* (*fig. 66.*) (*Buckthorn*). Thorns terminal. Flowers 4-cleft, diœcious. Leaves ovate, serrated. Stem erect. Berry with four stones. ——— *Hedges.* A deciduous shrub.

2. R. *Frangula* (*Black Alder*). Thorns none. Flowers all perfect. Style simple. Leaves entire, elliptical, acuminate, smooth. Berry with two stones, black. ——— *Hedges and Woods.* A deciduous shrub.

3. R. *Alaternus* (*The Alaternus*). Thorns none. Leaves ovate, elliptical or lanceolate, distantly toothed, quite smooth, coriaceous, evergreen. Racemes axillary, very short. Flowers diœcious. ——— *Istria. Shrubberies.* An evergreen shrub.

*Fig. 66.*

## XXII. LEGUMINOSÆ, OR FABACEÆ.

ESSENTIAL CHARACTER. — *Calyx* 5-parted or 5-toothed, very often irregular, and with the segments variously combined. *Petals* 5, inserted into the base of the calyx, either papilionaceous*, or regularly spreading. *Stamens* 10, either distinct or monadelphous, or diadelphous. *Ovary* simple, superior, 1-celled, 1- or many-seeded; *style* simple, proceeding from the upper margin; *stigma* simple. *Fruit* a legume. *Seeds* attached to the upper suture, solitary or several; *embryo* destitute of *albumen*, either straight, or with the radicle bent upon the cotyledons; *cotyledons* either remaining under ground in germination, or elevated above the ground, and becoming green like leaves. — *Herbaceous* plants, *shrubs*, or *trees*, extremely variable in appearance. *Leaves* alternate, most commonly compound; *petiole* tumid at the base. *Stipules*, 2 at the base of the petiole, and 2 at the base of each leaflet. *Pedicels* usually articulated, with 2 bractlets under the flower.

*** So far as the European Flora is concerned, the papilionaceous flowers generally characterise this order. In other countries, it varies very much from that structure.

* Papilionaceous, or butterfly-shaped, is when the upper petal, called the *standard*, is large and spreading, and two other petals, called *wings*, are small and stand forward, pressing upon two other petals joined together into a *keel*.

### Ulex.

Calyx with 2 bracteæ, 2-lipped; the upper lip with 3, the lower with 2 teeth. Stamens monadelphous. Pod oval-oblong, turgid, scarcely longer than the calyx, few-seeded.—Branching spiny shrubs. Flowers solitary, yellow. Pods villous.

1. U. *europæus* (*fig.* 67.) (*Furze*). Teeth of the calyx

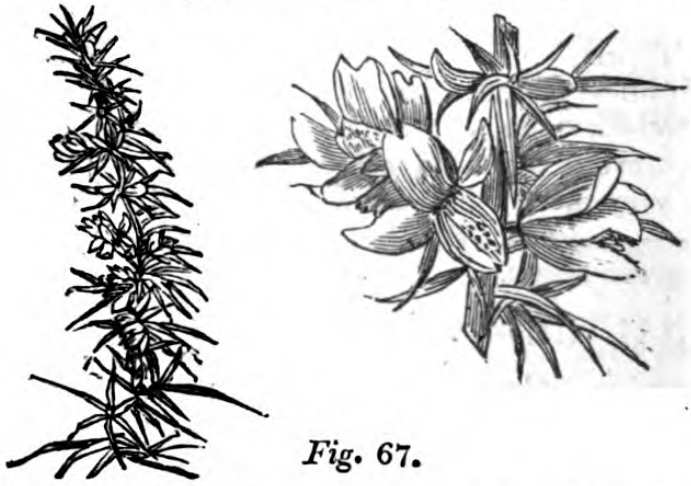


*Fig.* 67.

obsolete, converging. Bracteas ovate, lax. Branches erect, downy, angular, spiny. ——— *Heaths and Commons.*

### Cytisus.

Calyx 2-lipped; the upper lip generally entire, the lower slightly 3-toothed. Standard ovate, large. Keel very blunt. enclosing the stamens. Stamens monadelphous. Pod compressed, flat, many-seeded, without glands. Shrubs with yellow flowers, and ternate leaves.

1. C. *scoparius* (*The Broom*). Leaves ternate, or solitary. Branches angular, without thorns. Legume fringed. Style very long, curled inwards. Stigma terminal, minute, capitate. ——— *Heaths and Commons.*

2. C. *alpinus* (*The Scotch Laburnum*). Smooth. Racemes lateral, many-flowered, pendulous. Leaflets elliptical, somewhat downy at the edge with spreading hairs. Pods smooth, with the upper suture winged. ——— *Shrubberies.* A tree.

3. C. *Laburnum* (*Common Laburnum*). Closely downy. Racemes lateral, many-flowered, pendulous. Leaflets elliptical, smooth above. Pods silky, with the upper suture angular and carinate. ——— *Shrubberies.* A tree.

4. C. *nigricans.* Closely downy. Racemes terminal, many-flowered, erect. Leaflets obovate and oblong, smooth above. Calyxes without bracts. ——— *Midland parts of Europe. Shrubberies.* A deciduous bush.

### Lupinus.

Calyx bilabiate. Stamens monadelphous; anthers half sterile; style subulate, ascending. Stigma capitate. Keel rostrate. Pod coriaceous with spongy partitions.

1. L. *hirsutus* (*Dutch Blue Lupine*). Flowers large, blue, or pink, alternate, with little bracts at the base of the calyx. Upper lip of the calyx 2-parted, lower ½-trifid. Leaflets oblong, or obovate-cuneate, hairy on both sides. ——— *Gardens.* An annual.

### Ononis.

Calyx campanulate, 5-cleft, with linear segments. Standard large, streaked. Stamens monadelphous. Pod turgid, sessile, few-seeded. — Herbaceous plants or under-shrubs. Leaves ternate, occasionally simple. Flowers axillary, yellow or purple. Pedicels often bearing a bristle indicating an abortive floral leaf.

1. O. *spinosa* (*Rest-harrow*). Stem nearly erect, spinous, with one or two separate rows of hairs. Leaves ternate, oblong, wedge-shaped and entire towards the base. Flowers solitary. Lobes of the calyx shorter than the pods. ——— *Fields.*

### Medicago.

Calyx somewhat cylindrical, 5-cleft. Keel rather distant from the standard. Stamens diadelphous. Pod many-seeded, variable in form, always falcate or spirally twisted. — Herbaceous plants or shrubs. Stipules usually cut. Leaves stalked, trifoliate; leaflets toothed. Peduncles axillary, with 1, 2, or many flowers. Flowers yellow or purple.

1. M. *lupulina* (*Black Nonsuch*). Spikes ovate, erect. Legumes kidney-shaped, rugged and veiny, single-seeded Stem procumbent. ——— *Commons and Fields.* Flowers small, yellow.

2. M. *sativa* (*Lucerne*). Racemes upright, many-flowered. Legumes sickle-shaped. Stem procumbent. Leaflets emarginate with a point, toothed at the end. ——— *Fields*, cultivated. Flowers blue.

3. M. *scutellata* (*Snails*). Peduncles 1-3-flowered, shorter than the leaf. Legumes unarmed, snail-shaped, convex below, flat above; with about 6 concentrically spiral turns. Stipules ovate, toothed, Leaflets elliptical, finely toothed, the lower obovate. ——— *Gardens.* An annual.

### Melilotus.

Calyx tubular, 5-toothed. Keel simple; wings shorter than the standard. Pod longer than the calyx, coriaceous, 1- or few-seeded, indehiscent, of various forms.—Herbaceous plants. Stipules adnate to the petiole. Leaves 3-leaved; leaflets often toothed. Flowers in loose racemes, either yellow or white.

1. M. *officinalis* (*Melilot*). Racemes unilateral, rather lax. Legume ovate, acute, transversely wrinkled, hairy and compressed at the upper edge; with two seeds. Stem erect. Stipules awl-shaped. ——— *Fields.*

### Trifolium.

Calyx tubular, persistent, 5-cleft, not glandular; with subulate segments. Keel shorter than both wings and standard. Stamens diadelphous. Pod small, indehiscent, often ovate, with 1 or 2 seeds, shorter than the calyx by which it is covered, seldom oblong, with 3 or 4 seeds, and a little longer than the calyx. — Herbaceous plants. Stipules adhering to the petiole. Leaves 3- or 5-leaved. Flowers in heads or dense spikes, bracteate, purple, white, or pale yellow. Petals in some species cohering.

1. T. *repens* (*Dutch Clover*). Heads globose. Flowers somewhat stalked. Legume within the calyx, 4-seeded. Stems creeping, solid. ——— *Pastures.* Flowers white.

2. T. *medium* (*Cow-grass*). Spikes lax. Stems zigzag and branching. Petals nearly equal. Stipules tapering, converging. Two upper calyx-teeth rather the shortest. ——— *Pastures.* Flowers purple.

3. T. *pratense* (*Purple Clover*). Spikes dense. Stems ascending. Petals unequal. Calyx hairy; four of its teeth equal. Stipules ovate, bristle-pointed. ——— *Pastures.* Flowers purple.

4. T. *arvense.* Spikes cylindrical, very hairy. Stipules lanceolate, bristle-pointed. Calyx-teeth longer than the corolla, permanently bristle-shaped, Leaflets linear-obovate. ——— *Fields.* Flowers very small, pink.

5. T. *minus.* Heads hemispherical. Flower-stalks straight, rigid. Standard nearly even. Stems prostrate. Stipules ovate. Common footstalk very short. Style 4 times as short as the legume.——— *Fields.* Flowers yellow, eventually bent downwards.

### Lotus.

Calyx tubular, 5-cleft; wings about as long as the standard;

keel beaked. Pod cylindrical or compressed, apterous; style straight, subulate. — Herbaceous plants. Leaves ternate. Stipules leafy. Peduncles axillary, from 1 to 6-flowered, supported by a floral leaf. Flowers yellow, rarely white or pink.

1. L. *corniculatus*. Heads depressed, long-stalked, of few flowers. Stems recumbent, pithy. Legumes spreading, very slender, nearly cylindrical. Claw of the standard obovate. Filaments all dilated. ——— *Commons and fields.* Flowers yellow.

### COLUTEA.

Calyx 5-toothed; the upper teeth shortest. Standard spread flat, with two callosities. Keel terminated by a short truncated beak. Stamens diadelphous; filaments filiform. Style hooked at the point, hairy from the base to the apex. Legume stipitate, inflated.

1. C. *arborescens* (*Bladder Senna*). Leaflets elliptical, retuse. Callosities of the standard short. Legumes quite closed. ——— *Shrubberies.* A deciduous shrub. Flowers large, yellow.

### ORNITHOPUS.

Calyx with bracteæ, tubular, nearly equally 5-toothed. Keel very small and compressed. Stamens diadelphous. Pod compressed, consisting of numerous 1-seeded, indehiscent joints, truncate equally on each side, with parallel margins. — Hairy annuals. Leaves pinnate. Stipules small, adhering to the petiole. Peduncles axillary, few-flowered. Flowers small, white or rose colour. A leafy pinnated bractea under each head.

1. O. *perpusillus* (*Birdsfoot Trefoil*). Leaves pinnate. Flowers capitate, accompanied by a leaf. Legumes incurved, bearded. ——— *Commons and fields.*

### VICIA.

Calyx tubular, 5-cleft or 5-toothed, the 2 upper teeth shorter than the others. Stamens diadelphous. Style filiform, at nearly right angles with the ovarium, villous on the upper side, and below the apex on the under. Pod oblong, 1-celled, many-seeded. Seeds with an oval or linear lateral hilum. — Climbing herbaceous plants. Leaves abruptly pinnate, with a tendril in place of an odd leaflet. Stipules generally sagittate. Peduncles axillary, either long and many-flowered, or short and 1-flowered.

1. V. *sativa* (*Vetch, or Tare*). Flowers nearly sessile, mostly in pairs. Leaflets elliptic-oblong; lower ones abrupt. Stipules with a blackish depression beneath. Seeds orbicular, smooth. ——— *Fields.* Flowers purple.

### Pisum.

Calyx with foliaceous segments, the 2 upper shortest. Standard large, reflexed. Style compressed, keeled, villous on the upper side. Pod oblong, compressed, not winged, many-seeded. Seeds roundish, with a roundish hilum. — Annuals. Leaves abruptly pinnate, of 3 pairs, with a tendril in place of a terminal leaflet. Stipules large.

1. P. *sativum* (*Garden Pea*). Stipules ovate, half-cordate, toothed at the base. Leaflets in 3 pairs, ovate, entire, wavy at the edge. Peduncles 2- or many-flowered. Seeds globose, pale straw coloured. ——— *Gardens.* Flowers white.

2. P. *arvense* (*Grey Pea*). Stipules ovate, half-cordate, toothed at the base. Leaflets in 2 or 3 pairs, ovate, crenulated. Peduncles with about 2 flowers. Seeds angular, impressed, brown speckled. ——— *Fields.* Flowers purple.

### Faba.

The same as Vicia, but the seeds oblong, with a long scar on the shorter edge, the peduncles shorter than the flowers, and the pods leathery, and tumid.

1. F. *vulgaris* (*Garden Bean*). Racemes axillary, 2-4-flowered, very short. Leaflets terminated by a mucro, the upper in 2 pairs, elliptical, obtuse. Pods downy. Seeds pale straw colour, with a black hilum. ——— *Gardens.*

### Phaseolus.

Calyx bilabiate; the upper lip 2-, the lower 3-toothed. Style bearded above, spirally twisted, together with the stamens and keel. Legume with soft spongy partitions separating the seeds.

1. P. *vulgaris* (*Kidneybean*). Leaflets 3, ovate, acuminate. Racemes stalked, shorter than the leaves. Stem dwarf, erect. ——— *Gardens.* An annual.

2. P. *multiflorus* (*Running Kidneybean.*) Leaflets 3, ovate, acuminate. Racemes stalked, longer than the leaves. Stem twining. ——— *Gardens.* A perennial, with tuberous roots.

## XXIII. ROSACEÆ.

ESSENTIAL CHARACTER.—*Calyx* 4- or 5-lobed, permanent, with a disk either lining the tube or surrounding the orifice. *Petals* 5, perigynous, equal. *Stamens* indefinite, arising from the calyx, just within the petals. *Ovaries* superior, either solitary or several, 1-celled, sometimes cohering into a plurilocular pistil; *styles* lateral; *stigmas* usually simple, and emarginate on one side. *Fruit* either 1-seeded nuts, or acini, or follicles containing several seeds.—*Herbaceous* plants or *shrubs*. *Leaves* simple or compound, alternate, usually with 2 stipules at their base.

*** These plants have much general resemblance to Ranunculaceæ, but are known by their perigynous stamens, and permanent calyx. The following genera form the most genuine type of the order, from which the two sub-orders of Pomeæ and Amygdaleæ are a strongly marked departure.

### SPIRÆA.

Calyx 5-cleft, persistent. Stamens from 10 to 50, inserted along with the petals upon a disk adhering to the calyx. Follicles 1 or several, distinct, or occasionally cohering by the base.

1. S. *Ulmaria* (*Meadow Sweet*). Leaves interruptedly pinnate; downy beneath, the terminal leaflet largest and lobed. Stem herbaceous. Flowers cymose, with many styles. ——— *Meadows.*

2. S. *Filipendula* (*Dropwort*). Leaves interruptedly pinnate; leaflets uniform, serrated, smooth. Stem herbaceous. Flowers cymose, with many styles. ——— *Meadows.*

3. S. *hypericifolia* (*fig.* 68.) (*Italian May*). Leaves obovate, entire or toothed, smooth. Flowers small, white, in corymbs, which cover all the ends of the drooping branches. ——— *Shrubberies.* A deciduous shrub.

*Fig.* 68.

### Geum.

Calyx concave, 5-cleft, with 5 external bracteolæ. Petals 5. Stamens indefinite. Fruit consisting of numerous small nuts, tipped with the indurated persistent naked styles, and placed upon a dry receptacle. Seed ascending.—Herbaceous plants with compound leaves. Flowers white or yellow.

1. G. *urbanum* (*Avens*). Leaves ternate; radical ones somewhat lyrate. Stipules rounded, cut. Flowers nearly upright. Styles naked. ——— *Hedges.* Flowers small, yellow.

### Rubus.

Calyx somewhat campanulate, 5-lobed, without external bracteolæ. Petals 5. Stamens indefinite. Fruit consisting of numerous succulent drupes, placed upon an elevated dry receptacle. Seed inverted. — Shrubs or herbaceous plants. Stems usually long and procumbent, sterile the first year, bearing flowers and fruit the second, and then perishing. Leaves either simple, ternate, quinate, pedate, or pinnate, always more or less divided at the margin.

1. R. *Idæus* (*Raspberry*). Stem round, erect, smooth, with downy branches; their prickles straight and slender. Leaves pinnate, of 5 or 3 ovate, rather angular leaflets, very downy beneath. Clusters prickly, somewhat compound. Flowers pendulous. ——— *Gardens and woods.*

2. R. *fruticosus* (*Bramble*). Stem arched, angular, furrowed, aculeate, smooth. Leaflets quinate, ovate-oblong, acute, white and downy beneath. Panicle decompound, narrow, straight. Calyxes reflexed, almost unarmed. ——— *Hedges.*

3. R. *cæsius* (*fig.* 69.) (*Dewberry*). Stems arched, prickly. Leaflets ternate, ovate, doubly serrate, hairy. Calyx of the fruit erect. Fruit covered with a blue bloom. ——— *Ditches and woods.*

*Fig.* 69.

### FRAGARIA.

Calyx concave, 5-cleft, with 5 external bracteolæ. Petals 5. Stamens indefinite. Fruit consisting of numerous small nuts, placed upon a succulent receptacle. Seed inverted. — Herbaceous plants, propagating themselves by runners. Leaves ternate or simple.

1. F. *vesca* (*Wood Strawberry*). Calyx of the fruit reflexed. Hairs of the footstalks widely spreading; those of the partial flower-stalks close-pressed, silky. ——— *Woods.*

### POTENTILLA.

Calyx concave, 4- or 5-cleft, with 4 or 5 external bracteolæ. Petals 5. Stamens indefinite. Fruit consisting of numerous small nuts, placed on a dry elevated receptacle. Seed inverted.— Herbaceous plants or shrubs. Leaves compound. Stipules adhering to the petiole. Flowers white, yellow, or purple.

1. P. *reptans.* Leaflets 5, obovate, serrated. Stem creeping. Flower-stalks axillary, long, single-flowered. Petals 5. ——— *Hedges.*

2. P. *Tormentilla.* Stem ascending, branched. Leaves almost sessile. Stipules none, or 3-toothed. Flower-stalks long, axillary, single-flowered. Petals 4. ——— *Hedges.*

3. P. *anserina* (*Goosewort, Silver-weed*). Leaves interruptedly pinnate, serrated, silky. Stem creeping. Stalks axillary, solitary, single-flowered. ——— *Commons and ditch sides in moist places.*

### ROSA.

Fig. 70.

Nuts numerous, hairy, terminated by the persistent style, and enclosed within the fleshy tube of the calyx, which is contracted at the orifice, where it is surrounded by a fleshy disk. Sepals 5. Petals 5. Stamens indefinite. — Shrubs with prickly or naked stems. Leaves pinnate. Flowers red, white, or yellow, usually fragrant.

1. R. *arvensis.* Root-shoots long, trailing. Prickles unequal, falcate. Leaves deciduous, glaucous beneath. Styles united into a column. ——— *Hedges; in chalky countries chiefly.*

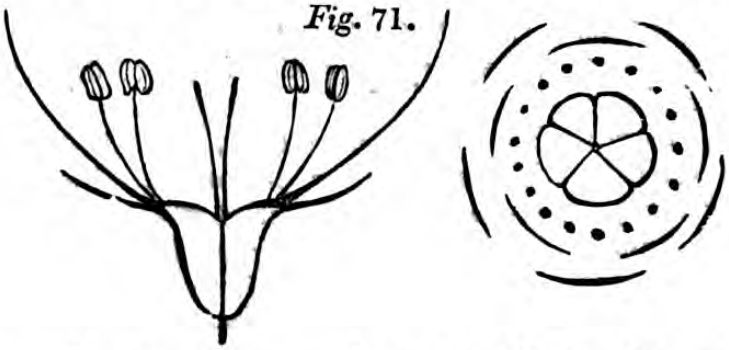
2. R. *canina* (*Dog Rose*). Leaflets ovate, acute, smooth on both sides. Prickles falcate, even-sized. Fruit red, with deciduous sepals, and supported by permanent bracts. ——— *Hedgerows.*

3. R. *spinosissima* (*fig.* 70.) (*Scotch Rose*). Leaflets ovate, acute, smooth, with simple serratures. Prickles straight, very numerous and unequal, many of them glandular. Fruit black, with permanent sepals, not supported by bracts. ——— *Hedges.*

## Sub-Order Pomeæ.

Essential Character.—*Calyx* superior. *Stamens* indefinite, inserted in a ring in the throat of the calyx. *Ovaries* from 1 to 5, adhering more or less to the sides of the calyx and each other; *styles* from 1 to 5; *stigmas*

*Fig.* 71.



simple. *Fruit* a pome, 1- to 5-celled; the endocarp either cartilaginous, spongy, or bony.—*Trees* or *shrubs*. *Leaves* alternate, stipulate, simple, or compound. *Flowers* in terminal cymes, white or pink.

### Cratægus.

Segments of the calyx acute. Petals roundish. Styles 2 to 5. Fruit oval or round, concealing the upper ends of the carpels. Endocarpium bony. — Trees with lobed leaves. Flowers corymbose.

1. C. *Oxyacantha* (*Whitethorn*). Leaves obovate, wedge-shaped, either entire, trifid, or cut, quite smooth, and rather lucid. Flowers in corymbs, with from 1 to 3 styles. Calyx destitute of glands. ——— *Hedges.*

### Pyrus.

Calyx 5-toothed. Petals roundish, spreading. Styles 2, 3, or 5. Fruit fleshy, with 5 distinct cells. Endocarpium

cartilaginous. Seeds 2 in each cell. Testa cartilaginous. — Trees with serrated, undivided, or pinnated leaves, and cymose flowers. Bracteæ deciduous.

1. P. *Malus* (*Apple*). Leaves simple serrated, rugose. Flowers in a simple sessile umbel. Fruit umbilicate at each end, not gritty, round. ——— *Orchards and gardens.*

2. P. *communis* (*Pear*). Leaves simple, ovate, serrated. Flower-stalks corymbose. Fruit turbinate, gritty. ——— *Orchards and gardens.*

*Fig.* 72.

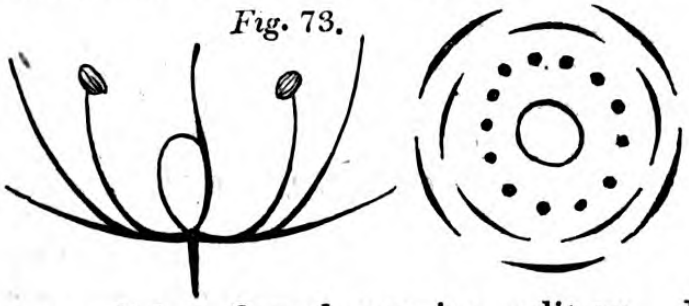
3. P. *Aucuparia* (*Mountain Ash*). Leaves pinnate; leaflets uniform, serrated, smooth. Flowers corymbose. Styles about 3. Fruit globular. ——— *Plantations and woods.*

4. P. *torminalis* (*fig.* 72.) (*Service Tree*). Leaves cordate, ovate: lobed in a pinnatifid manner, when young downy beneath. Flowers corymbose. ——— *Woods and plantations.*

## Sub-Order Amygdaleæ.

Essential Character. Calyx with the tube lined with a waxy disk. Carpel superior, solitary. Fruit a drupe.

*Fig.* 73.



### Amygdalus.

Drupe covered with a woolly skin, and having a stone marked by deep irregular furrows.

1. A. *communis* (*Almond*). Flesh of the drupe dry, splitting spontaneously into two valves. ——— *Gardens.* A tree.
2. A. *Persica* (*Peach*). Flesh of the fruit juicy, not splitting. ——— *Gardens.* A tree.

### Prunus.

Vernation convolute. Drupe covered with bloom, with a smooth stone deeply furrowed at its inner edge.

1. P. *Armeniaca* (*Apricot*). Flowers lateral, solitary or in pairs, on short stalks. Leaves ovate, somewhat cordate. Fruit downy. ——— *Gardens.*
2. P. *domestica* (*Plum*). Flower-stalks solitary or in pairs. Leaves lanceolate-ovate. Branches without thorns. ——— *Gardens.*
3. P. *spinosa* (*Sloe, or Blackthorn*). Flower-stalks solitary. Leaves lanceolate, smooth. Branches thorny at the end. ——— *Hedgerows.* Fruit very austere.

### Cerasus.

Vernation conduplicate. Drupe not covered with bloom, with a smooth stone not furrowed at its inner edge.

1. C. *lusitanica* (*Portugal Laurel*). Racemes straight, axillary, longer than the leaf. Leaves ovate-lanceolate, serrated, not glandular, evergreen. ——— *Gardens.*
2. C. *Laurocerasus* (*Common Laurel*). Racemes shorter than the leaves. Leaves ovate-lanceolate, distantly serrated, coriaceous, evergreen. Fruit black, round, bitter. ——— *Gardens.*
3. C. *Padus* (*Bird Cherry*). Racemes long, pendulous. Leaves ovate-lanceolate, acuminate, thin; smooth beneath, with spreading serratures. Fruit round, bitter. ——— *Woods.*
4. C. *communis* (*Cherry*). Umbels many-flowered, before the leaves. Leaves flat, smooth, shining, somewhat coriaceous, elliptical, all acuminated. ——— *Gardens.*

## XXIV. ONAGRACEÆ.

Essential Character. — *Calyx* superior, tubular, with the limb 4-lobed; the lobes cohering in various degrees, with a valvate æstivation. *Petals* equal in number to the lobes of the calyx, into the throat of which they are inserted. *Stamens*, 4 or 8 inserted into the calyx; *filaments* distinct; *pollen* triangular, usually cohering by threads. *Ovary* of 4 cells; *style*

filiform; *stigma* either capitate or 4-lobed, *Fruit* baccate or capsular, many-seeded, with 4 cells. *Seeds* numerous. — *Herbaceous* plants or *shrubs*. *Leaves* alternate or opposite, simple, entire, or toothed. *Flowers* red purple, white, blue, or yellow, axillary, or terminal.

*** The $\frac{2}{\sqrt{}}$, which exists in *all* the parts of the flower, will usually indicate this order with sufficient precision, if attention is paid to the ovary being inferior.

### Epilobium.

Calyx tubular, with a 4-parted limb, which falls off after flowering. Petals 4. Stamens 8. Capsule linear, bluntly 4-cornered, with 4 cells, 4 valves, and many seeds. Seeds pappose. — Herbaceous plants. Leaves opposite or alternate. Flowers axillary and solitary, or terminal in spikes, purple or rose colour.

1. E. *angustifolium* (*French Willow*). Leaves scattered, linear-lanceolate, veiny, smooth. Petals unequal. Stamens declinate. ——— *Gardens.*

2. E. *hirsutum* (*Codlings and Cream*). Leaves half clasping the stem, ovate-lanceolate, hairy. Stem copiously branched. Root creeping. ——— *Meadows and ditches.*

3. E. *montanum*. Leaves stalked, ovate, toothed. Stem round. Stigma in 4 deep segments. ——— *Hedgerows.*

### Œnothera.

Calyx tubular, deciduous, with a reflexed 4-parted limb, the segments of which cohere irregularly. Petals 4. Stamens 8. Pollen cohering by threads. Stigma 4-lobed. Capsule linear or winged, with 4 cells, 4 valves, and many seeds. Seeds naked. — Herbaceous plants. Leaves alternate, toothed, or pinnatifid. Flowers sessile, axillary, solitary, or in terminal spikes, blue, red, yellow, or white.

1. Œ. *biennis*. Leaves ovate-lanceolate, flat. Stem rough, somewhat hairy. Stamens equal. Petals undivided. ——— *Gardens.*

### Circæa.

Calyx 2-parted. Petals 2, obcordate. Stamens 2, alternate with the petals.

1. C. *lutetiana* (*Enchanter's Nightshade*). Stem erect.

Leaves ovate, slightly toothed, opaque and downy. ——— *Woods.* Flowers white.

## XXV. LYTHRACEÆ.

ESSENTIAL CHARACTER. — *Calyx* monosepalous, tubular, the lobes with a valvate or separate æstivation, their sinuses sometimes lengthened into other lobes. *Petals* inserted between the lobes of the calyx, very deciduous, sometimes wanting. *Stamens* inserted into the tube of the calyx below the petals, to which they are sometimes equal in number; sometimes they are twice, or even thrice, and occasionally four times as numerous; *anthers* 2-celled, opening longitudinally. *Ovary* superior, 2- or 4-celled; *style* filiform; *stigma* usually capitate. *Capsule* membranous, covered by the calyx. *Seeds* numerous, small.—*Herbs*, rarely *shrubs*. *Branches* frequently 4-cornered. *Leaves* opposite, seldom alternate, entire, without either stipules or glands. *Flowers* axillary, or in terminal spikes or racemes.

*** No other European plants have a tubular strongly ribbed calyx, below the sinuses of which the petals are inserted, and stamens growing to the tube of the calyx some distance below the insertion of the petals.

### LYTHRUM.

Calyx cylindrical, striated, with 8 to 12 teeth, of which 4 to 6 are broader than the rest and erect, the others smaller and spreading. Petals 4 or 6, inserted into the orifice of the calyx, opposite the smaller lobes of the calyx. Stamens situated in the middle or at the base of the calyx, twice as numerous as the petals, or occasionally fewer. Capsule oblong, 2-celled, many-seeded, included in the calyx. — Erect herbaceous plants. Leaves opposite. Stems square. Flowers purple, axillary.

1. *L. Salicaria.* Leaves opposite, lanceolate; heart-shaped at the base. Flowers in whorled leafy spikes. Stamens 12. ——— *Ditches and meadows.* Flowers large, purple.

## XXVI. MYRTACEÆ.

ESSENTIAL CHARACTER. — *Calyx* superior, 4- or 5-cleft. *Petals* equal in number to the segments of the calyx, with a quincuncial æstivation. *Stamens* twice as many as the petals, or indefinite. *Ovary* inferior, 4- 5- or 6-celled; *style* simple; *stigma* simple. *Fruit* fleshy. *Seeds* usually indefinite, variable in form. — *Trees* or *shrubs*. *Leaves* opposite or alternate, entire, with transparent dots, and usually with a vein running parallel with their margin. *Inflorescence* variable, usually axillary.

*** The dotted leaves and inferior ovary distinguish Myrtaceæ among European plants, and are often not a bad mark of distinction in other countries.

### MYRTUS.

Tube of the calyx roundish; the limb 5-parted. Petals 5, Stamens distinct. Fruit, a 2- or 3-celled juicy berry, crowned by the limb of the calyx.

1. M. *communis* (*Myrtle*). Peduncles solitary, 1-flowered, rather shorter than the leaf. Bracts 2, linear, deciduous, below the flower. Leaves ovate or lanceolate, acute. ——— *Gardens*. Common in the warm parts of the South of Europe.

## XXVII. CRASSULACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 5 or 6. *Petals* the same number, regular, and sharp-pointed. *Stamens* inserted with the petals, either equal to them in number and alternate with them, or twice as many, those opposite the petals being shortest, and arriving at perfection after the others. *Hypogynous scales* several, 1 at the base of each carpel. *Ovaries* of the same number as the petals, opposite to which they are placed, 1-celled, tapering into stigmas. *Fruit* consisting of several follicles, opening by the suture in their face. *Seeds* attached to the margins of the suture. — Succulent *herbs* or *shrubs*. *Leaves* entire or pinnatifid: *sti-*

*pules* none. *Flowers* usually in cymes, sessile, often arranged unilaterally along the division of the cymes.

*** The peculiarly regular alternation of all the parts of the flower, and the separation of the carpels, which look like petals rolled up, distinguish these plants from all others belonging to the Flora of Europe, especially if the succulent leaves are taken into account.

### Rhodiola.

Flowers diœcious. Calyx 4-parted. Petals 4. Stamens 8. Carpels 4, capsular, many-seeded.

1. R. *rosea*. Leaves oblong, serrated at the tip, smooth. Root fleshy. Stem simple. ——— *Rocks and woods.* Calyx purple. Petals yellowish.

### Sedum.

Sepals 5, cohering at the base, turgid, and often foliaceous. Petals 5, spreading. Stamens 10. Hypogynous scales entire. Fruit in 5 parts. — Herbs with fleshy leaves, many branches, and cymose flowers.

1. S. *acre* (*Stonecrop*). Leaves alternate, nearly ovate, thick, tumid; spurred at the base. Cyme of three smooth branches, leafy. ——— *Old walls.* Flowers yellow.

2. S. *Telephium* (*Orpine*). Leaves flattish, serrated. Corymb leafy. Stem erect. ——— *Mountainous woods.*

### Sempervivum.

Sepals from 6 to 20, slightly cohering at the base. Petals, the same number, acuminate. Stamens twice as numerous as the petals. Hypogynous scales lacerated. Fruit of as many parts as there are petals. — Herbaceous perennial plants or shrubs; propagated by offsets arising from the axils of the leaves. Leaves thick, fleshy. Flowers in cymes, corymbs, or panicles, white, yellow, or purple.

1. S. *tectorum* (*Houseleek*). Leaves fringed, offsets spreading. Edges of the petals hairy, entire. ——— *Roofs of cottages and sheds.*

## XXVIII. GROSSULACEÆ.

Essential Character. — *Calyx* superior, 4- or 5-

parted, regular. *Petals* 5, minute, inserted in the throat of the calyx. *Stamens* 5, inserted alternately with the petals, very short. *Ovary* 1-celled, with 2 opposite parietal placentæ; *ovules* numerous; *style* 2- 3- or 4-cleft. *Berry* crowned with the remains of the flower, 1-celled; the cell filled with pulp. *Seeds* numerous, suspended among the pulp by long filiform cords; *testa* externally gelatinous, adhering firmly to the *albumen*; *embryo* minute.—*Shrubs*, either unarmed or spiny. *Leaves* alternate, lobed, with a plaited vernation. *Flowers* in axillary racemes, with bracts at their base, rarely unisexual.

### Ribes.

The character the same as that of the order; this being the only genus.

1. R. *rubrum* (*The Red Currant*). No prickles. Clusters smooth, pendulous. Flowers but slightly concave. Petals inversely heart-shaped. ——— *Woods and gardens.*

2. R. *nigrum* (*The Black Currant*). No prickles. Clusters hairy, pendulous, with a separate flower-stalk at the base of each. Flowers oblong. ——— *Gardens.*

3. R. *Grossularia* (*The Gooseberry*). Prickles 1, 2, or 3 under each bud. Branches otherwise smooth, spreading. Stalks single-flowered. Bracteas close together. Segments of the calyx reflexed, shorter than the tube. ——— *Hedges and gardens.*

## XXIX. SAXIFRAGACEÆ.

Essential Character.—*Calyx* either superior or inferior, of 4 or 5 sepals, which cohere more or less at their base. *Petals* 5. *Stamens* 5-10; *anthers* 2-celled, bursting longitudinally. *Disk* either hypogynous or perigynous, sometimes nearly obsolete, sometimes annular and notched. *Ovary* inferior, or nearly superior, consisting of 2 carpels, cohering more or less by their face, but distinct and diverging at the apex. *Stigmas* sessile on the tips of the lobes of the ovary. *Fruit* generally a membranous 1- or 2-celled capsule, with the cells divaricating when ripe. *Seeds* numerous, very

minute.—*Herbaceous* plants, often growing in patches. *Leaves* simple, either divided or entire, alternate, without stipules. *Flower-stems* simple, often naked.

*** All European plants with polypetalous flowers, and two divaricating many-seeded carpels, belong to this order, which is otherwise much like Rosaceæ, except in being herbaceous.

SAXIFRAGA.

Calyx 5-lobed, erect. Petals equal. Stamens 10, perigynous. Disk obsolete. Capsule half inferior, with 2 cells. — Stems generally branching and forming tufts, sometimes simple. Leaves usually divided more or less. Flowers white or purple, seldom yellow.

1. S. *granulata*. Leaves kidney-shaped, lobed. Stem panicled, leafy. Root granulated.———*Hedgerows*. Flowers white.

ROBERTSONIA.

Calyx 5-leaved, reflexed. Petals equal, or nearly so. Stamens 10, hypogynous. Disk obsolete. Calyx superior, with 2 cells. Seeds globose. — Stems branching and forming dense tufts. Leaves broad, notched, often cartilaginous at the edge. Flowers white or pink, rarely pale yellow.

1. R. *umbrosa* (*London Pride*). Leaves obovate, retuse, quite smooth, with cartilaginous crenatures, when full grown spreading. Petioles short, dilated. Pedicels few-flowered. ——— *Irish mountains. Gardens.* Flowers rather pink.

## XXX. UMBELLIFERÆ, OR APIACEÆ.

ESSENTIAL CHARACTER.— *Calyx* superior, either entire or 5-toothed. *Petals* 5, inserted on the outside of a fleshy epigynous disk; usually inflexed at the point. *Stamens* 5, incurved in æstivation. *Ovary* inferior, 2-celled; crowned by a double fleshy disk; *styles* 2, distinct; *stigmas* simple. *Fruit* consisting of 2 carpels, separable from a common axis, to which they adhere by their face (*the commissure*); each carpel traversed by elevated *ridges*, of which 5 are primary, and 4, alternating with them, secondary; the ridges are separated by *channels*, below which are often placed, in

the substance of the pericarp, certain linear receptacles of coloured oily matter called *vittæ*.—*Herbaceous* plants, with fistular furrowed stems. *Leaves* usually divided, sometimes simple, sheathing at the base. *Flowers* in umbels, white, pink, yellow, or blue, generally surrounded by an involucre.

*** The flowers growing in umbels, the superior petals turned in at their points, and the inferior fruit, which splits into halves, commonly called seeds, are of themselves sufficient to distinguish this order, the species and genera of which are often not to be known without attention being paid to the fruit.

### Hydrocotyle.

Calyx an obsolete margin. Petals ovate, entire, acute, with a straight point. Fruit compressed at the side, so as to form 2 little shields. Carpels with *5*, filiform ridges, those of the keel and sides nearly obsolete, the intermediate arched, without vittæ.—Creeping herbs, with simple leaves, and green obscure flowers.

1. H. *vulgaris* (*Sheeprot*). Leaves orbicular, peltate, smooth; cloven at the base. Umbels somewhat aggregate. Flowers nearly sessile. ——— *Bogs and marshes.* A small stemless creeping plant, with the greenish-yellow flowers hidden below the leaves.

### Apium.

Calyx an obsolete margin. Petals roundish, entire, with an involute point. Fruit roundish, contracted at the sides, double. Carpels with *5*, filiform, equal ridges, of which the lateral form a margin. Channels with single vittæ, except the outermost, which have sometimes 2 or 3.—Involucre none. Flowers white.

1. A. *graveolens* (*Celery*). Leaflets of the stem-leaves wedge-shaped. Stem furrowed. ——— *Marshes. Gardens.*

### Petroselinum.

Calyx an obsolete margin. Petals roundish, incurved, entire, scarcely emarginate, contracted into an inflexed lobe. Fruit ovate, contracted at the side, nearly double. Carpels with *5*, equal, filiform ridges, of which the lateral

form a margin. Channels with single vittæ. — Universal involucre few-leaved; partial many-leaved. Flowers white.

1. P. *sativum* (*Parsley*). Stem erect, angular. Leaves shining, tripinnate, with the lower leaflets ovate-cuneate, trifid and toothed, the upper ternate, lanceolate, entire, and trifid. ——— *Gardens.*

### ÆGOPODIUM.

Calyx an obsolete margin. Petals obovate, emarginate, inflexed. Fruit compressed at the side, oblong. Carpels with *5*, filiform ridges, of which the lateral form a margin. Channels without vittæ.—Involucre none. Flowers white.

1. Æ. *Podagraria* (*Goutweed*). Stem deeply furrowed. Leaves biternate and ternate; leaflets lanceolate-ovate, acuminate. ——— *Hedgerows.*

### ŒNANTHE.

Calyx *5*-toothed. Petals obovate, emarginate, inflexed. Fruit nearly taper, crowned by the erect styles. Carpels with *5*, rather convex, obtuse ridges, of which the lateral form a margin, and are rather broader than the others. Channels with single vittæ. Axis wanting. —Universal involucre wanting; partial many-leaved. Flowers white.

1. Œ. *crocata* (*Water Dropwort*). Leaflets all wedge-shaped, many-cleft, nearly uniform. Fruit linear-oblong, with slender ridges. ——— *Ditches and meadows.*

2. Œ. *fistulosa.* Root sending forth runners. Stem-leaves pinnate, cylindrical, tubular. Universal involucre mostly wanting. ——— *Marshes and ponds.*

### ÆTHUSA.

Calyx obsolete. Petals obovate, emarginate, inflexed. Fruit roundish-ovate. Carpels with *5*, elevated, thick, acutely keeled ridges, of which the lateral form a margin, and are rather wider than the others, surrounded by a somewhat winged keel. Channels with one vitta. — Universal involucre wanting; partial 3-leaved, pendulous. Flowers white.

1. Æ. *Cynapium* (*Fool's Parsley*). Leaves uniform; leaflets wedge-shaped, decurrent, with lanceolate segments. ——— *Waste places.*

### Fœniculum.

Calyx obsolete. Petals roundish, entire, with a nearly square, retuse, involute segment. Fruit nearly taper. Carpels with 5, prominent, obtusely keeled ridges, of which the lateral form a margin, and are rather broader than the others. Channels with 1 vitta.—Involucre none. Flowers yellow.

1. F. *officinale* (*Fennel*). Stem round at the base. Leaves cut into very fine capillary segments. Involucre none. ——— *Gardens.*

### Pastinaca.

Calyx almost obsolete. Petals roundish, entire, involute, with a broad, inflexed, blunt, middle segment. Fruit flattened at the back, surrounded by a dilated flat margin. Carpels with very fine ridges; the 3 dorsal equidistant, the 2 lateral contiguous to the dilated margin. Channels with single vittæ. — Involucre neither universal nor partial, or with very few leaves. Flowers yellow.

1. P. *sativa* (*Parsnep*). Leaves simply pinnate; downy beneath, with ovate-oblong, or oblong obtuse, crenated leaflets, of which the lateral are lobed at the base. ——— *Gardens.*

### Heracleum.

Calyx 5-toothed. Petals obovate, emarginate, inflexed; the outer often radiant and bifid. Fruit flattened at the back, surrounded by a flat dilated margin. Carpels with very minute ridges; the 3 dorsal equidistant, the 2 lateral contiguous to the dilated margin. Channels with single clavate vittæ. — Universal involucre deciduous; partial many-leaved. Flowers large, white.

1. H. *Sphondylium* (*Cow Parsnep*). Leaves pinnate; leaflets pinnatifid, cut and serrated. Ovary downy. Fruit oval, obtuse, emarginate, smooth. ——— *Roadsides, hedge-rows,* &c.

### Torilis.

Calyx 5-toothed. Petals obovate, emarginate, inflexed; the outer larger than the others, and bifid. Fruit contracted at the side. Carpel with the 5 primary ridges bristly, of which the 3 middle are dorsal, and the 2 lateral ones in the plane of the commissure; the secondary ridges obliterated by the multitude of prickles which cover the channels. Channels under the prickles with single vittæ. — Involucre variable; the partial many-leaved. Flowers white or pink.

1. T. *Anthriscus.* Umbels of many close rays. General involucre many-leaved. Leaflets pinnatifid. Branches nearly upright. ——— *Hedgerows.*

### Scandix.

Calyx an obsolete margin. Petals obovate, truncate, inflexed. Fruit compressed at the side, with a very long beak. Carpels with 5, obtuse, equal ridges, of which the lateral form a margin. Channels without vittæ, or with scarcely any. — Universal involucre none, or few-leaved; partial 5- or 7-leaved. Flowers white.

1. S. *Pecten* (*Venus's Comb*). Fruit nearly smooth, with a bristly-edged beak. Umbels simple; solitary or in pairs. Leaflets of the involucre jagged. Petals inflexed at the point. ——— *Hedges and woods.*

### Anthriscus.

Calyx an obsolete margin. Petals obovate, truncate, or emarginate, inflexed, often very short. Fruit contracted at the side, beaked. Carpels almost taper, without ridges, the beak only having 5. — Universal involucre none; partial many-leaved. Flowers white.

1. A. *sylvestris.* Umbels terminal, stalked. Leaflets of the involucre ovate, membranous. Leaves triply pinnate; leaflets ovate, pinnatifid, rough-edged. ——— *Hedges and woods.*

### Chærophyllum.

Calyx an obsolete margin. Petals obovate, emarginate, inflexed. Fruit compressed, or contracted at the sides. Carpels with 5, obtuse, equal ridges, of which the lateral form a margin, the commissure with a deep furrow. Channels with a single vitta. — Universal involucre wanting, or few-leaved; partial of several leaflets. Flowers white.

1. C. *nodosum.* Stem swollen under the nodes. Leaves ternate, bipinnate; leaflets ovate, pinnatifid, cut and toothed. Fruit hispid. Stigma subsessile. ——— *Hedges.*

2. C. *temulum.* Fruit nearly smooth. Stem rough, swollen under each joint. Leaflets pinnatifid, with blunt lobes. Styles recurved, as long as the disk. ——— *Hedges.*

### Conium.

Calyx an obsolete margin. Petals obovate, emarginate, inflexed. Fruit compressed at the side, ovate. Carpels with 5, prominent, wavy, crenated, equal ridges, of which

the lateral form a margin. Channels with many streaks, but no vittæ. — Universal involucre few-leaved; partial 3-leaved, halved.

1. C. *maculatum* (*Hemlock*). Stem polished and spotted, much branched. Leaves decompound. Leaflets of the involucels lanceolate, shorter than the partial umbels. ——— *Fields, hedges, and roadsides.*

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The following are additional natural orders of this sub-class, included in the European Flora, but consisting of only a small number of species, and of less importance than the preceding.

## ARALIACEÆ.

Essential Character. — *Calyx* superior, entire, or toothed. *Petals* definite, 5 to 10, deciduous, valvate in æstivation, occasionally absent. *Stamens* equal in number to the petals, or twice as many, arising from within the border of the calyx, and from without an epigynous disk. *Ovary* inferior, with more cells than 2; *ovules* solitary, pendulous; *styles* equal in number to the cells, sometimes connate; *stigmas* simple. *Fruit* succulent or dry, consisting of several 1-seeded cells. *Seeds* solitary, pendulous, adhering to the pericarp.— *Trees, shrubs,* or *herbaceous* plants, with the habit of Umbelliferæ.

*** The *Ivy* (*Hedera Helix*) and the *Moschatel* (*Adoxa Moschatellina*) are the only two European plants of this order, which differs from Apiaceæ chiefly in having valvate petals, and more cells to the ovary than 2.

## FICOIDEÆ, or MESEMBRYACEÆ.

Essential Character. — *Sepals* definite, usually 5, but varying from 4 to 8, more or less combined at the base, either cohering with the ovary, or nearly distinct

from it. *Petals* indefinite, coloured, in many rows, opening beneath bright sunshine. *Stamens* arising from the calyx, indefinite, distinct; *anthers* oblong, incumbent. *Ovary* inferior, or nearly superior, many-celled; *stigmas* numerous, distinct. *Capsule* surrounded by the fleshy calyx, many-celled, opening in a stellate manner at the apex. *Seeds* definite, or more commonly indefinite, attached to the inner angle of the cells. — *Shrubby* or *herbaceous* plants. *Leaves* succulent, opposite, simple. *Flowers* usually terminal.

*** An annual *Mesembryanthemum* or two, resembling what is called in gardens the Ice Plant, are all of this order which Europe comprehends.

## PORTULACACEÆ.

Essential Character.—*Sepals* 2. *Petals* 5. *Stamens* 5, or fewer, and opposite the petals to which they adhere, or indefinite in number, and distinct. *Ovary* superior, 1-celled, many-seeded, with a few central placentæ. *Fruit* capsular. — *Herbaceous* plants with inconspicuous flowers. *Leaves* succulent, without stipules.

*** *Common Purslane* (*Portulaca oleracea*), and two or three obscure weeds, are the only European species of this order, which is precisely marked by its 2 sepals, 5 petals, and superior 1-celled many-seeded ovary, with a few central placentæ.

## HALORAGEÆ.

Essential Character. — *Calyx* superior, with a minute limb. *Petals* minute, or wanting. *Stamens* equal in number to the petals, or occasionally fewer. *Ovary* adhering inseparably to the calyx, with 1 or more cells; *style* none; *stigmas* equal in number to the cells; *ovules* pendulous. *Fruit* dry, indehiscent, membranous, or bony, with 1 or more cells. *Seeds* solitary, pendulous. — *Herbaceous* plants or *under-shrubs*, often growing in wet places. *Leaves* either alternate, oppo-

site, or whorled. *Flowers* axillary, sessile, occasionally monœcious or dicœcious.

*** Weeds, usually inhabiting wet places. *Hippuris vulgaris* (*the Horsetail*) and *Myriophyllum* are the principal European forms. The order is, probably, a mere degeneration of Onagraceæ, to which it certainly is nearly allied.

## ILLECEBRACEÆ.

Essential Character. — *Sepals* 5, seldom 3 or 4, sometimes distinct, sometimes cohering. *Petals* minute, occasionally wanting. *Stamens* opposite the sepals, if equal to them in number, sometimes fewer by abortion, sometimes more numerous; *filaments* distinct; *anthers* 2-celled. *Ovary* 1-celled, rarely 3-celled, with 1 or more *ovules*, superior; *styles* 2-5, either distinct, or partially combined. *Fruit* small, dry, 1-celled, rarely 3-celled, either indehiscent, or opening with 3 valves. *Seeds* either numerous, upon a free central placenta, or solitary and pendulous from a funiculus originating in the base of the cavity of the fruit.—*Herbaceous* or *half-shrubby* branching plants, with opposite or alternate, often fascicled, sessile, entire *leaves*, and scarious *stipules*. *Flowers* minute, with scarious bracts.

*** The species are little unimportant weeds belonging to the genera *Herniaria*, *Illecebrum*, *Polycarpon*, and some others. Their large membranous stipules particularly distinguish them.

## RESEDACEÆ.

Essential Character.—*Calyx* many parted. *Petals* lacerated, unequal. *Disk* hypogynous, one-sided, glandular. *Stamens* definite; *filaments* erect; *anthers* 2-celled, opening longitudinally. *Ovary* sessile, 3-lobed, 1-celled, many-seeded, with 3 parietal placentæ; *stigmas* 3, glandular, sessile. *Fruit* dry and membranous,

or succulent, opening at the apex. *Seeds* several, reniform, attached to 3 parietal placentæ. — *Herbaceous* plants with alternate *leaves*, the surface of which is minutely papillose; and minute, gland-like *stipules*.

*** The garden *Mignonette* (*Reseda odorata*), and the common wild flowers *Reseda Luteola* and *R. lutea*, are representatives of this curious but inconsiderable order.

## CHAP. VI.

### OF COROLLIFLORAL EXOGENS.

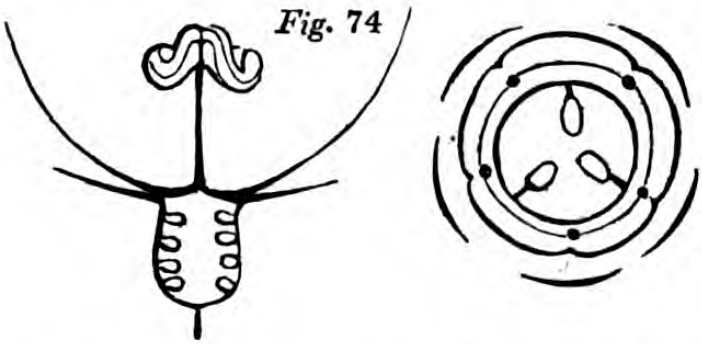
THE following are the principal orders of this subclass; viz.—

31. Cucurbitaceæ*; 32. Cornaceæ; 33. Caprifoliaceæ; 34. Stellatæ; 35. Valerianaceæ; 36. Dipsaceæ; 37. Compositæ; 38. Campanulaceæ; 39. Ericaceæ; 40. Primulaceæ; 41. Gentianaceæ; 42. Convolvulaceæ; 43. Boraginaceæ; 44. Labiatæ; 45. Solanaceæ; 46. Scrophulariaceæ; 47. Lentibulaceæ; 48. Plantaginaceæ; 49. Plumbaginaceæ.

The differences between these orders are shown in the following short characters: —

31. *Cucurbitaceæ.*—Flowers unisexual. Sepals, pe-

*Fig.* 74

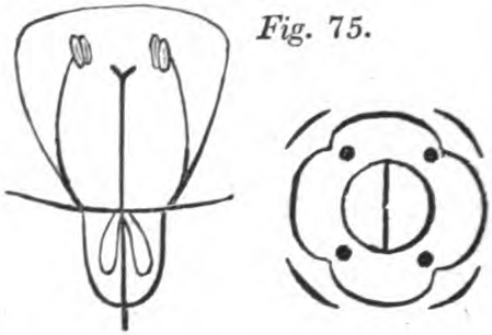


tals, and stamens, 5 each. Carpels united into an inferior pistil, with 3 parietal placentæ. Fruit fleshy.

32. *Cornaceæ.*—Sepals, petals, and stamens, 4 each.

* This natural order is placed by De Candolle among his *Calyciflorœ*, but is transferred to its present station because it agrees with the character of *Corolliflorœ*.

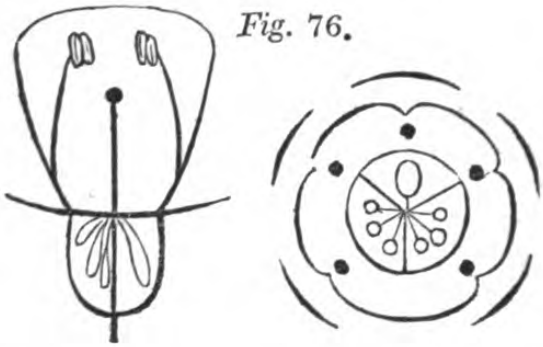
*Fig.* 75.



Carpels united into an inferior, 2-celled pistil, with solitary pendulous ovules, and a single style. Fruit a drupe. Stem round.

33. *Caprifoliaceæ.*—Sepals, petals, and stamens, 5

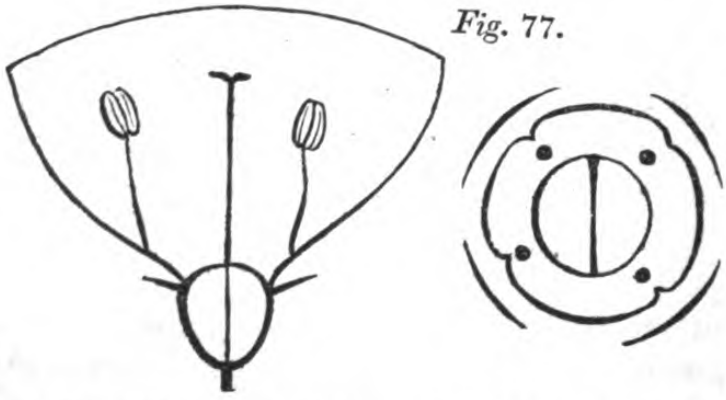
*Fig.* 76.



each. Carpels united into an inferior 3-celled, many-seeded pistil. Fruit not a drupe.

34. *Stellatæ.*—Sepals, petals, and stamens, 4 or 5

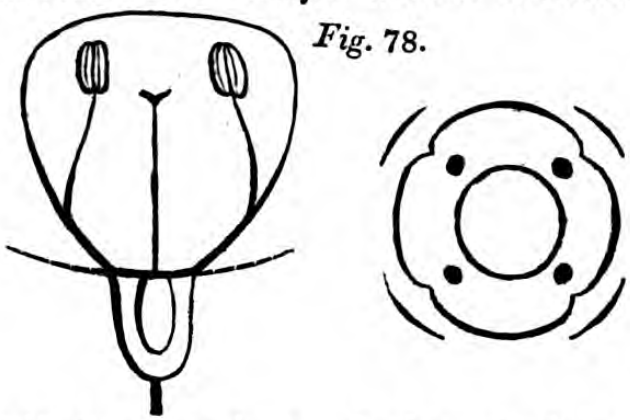
*Fig.* 77.



each. Carpels united into an inferior 2-celled pistil, with solitary erect ovules, and 2 styles. Stem angular.

35. *Valerianaceæ.*—Calyx with a membranous or

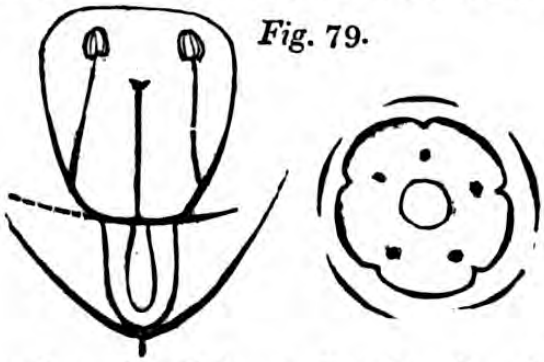
*Fig.* 78.



pappose * limb, and naked. Anthers distinct. Carpels solitary, inferior, with one pendulous ovule.

36. *Dipsaceæ.*—Calyx with a membranous or pap-

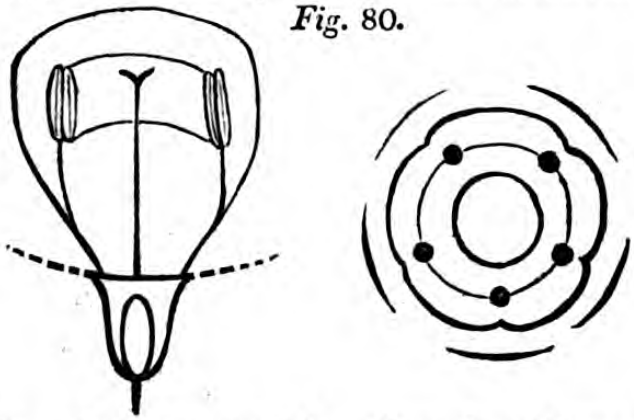
*Fig.* 79.



pose limb, and enclosed in an involucel. Anthers distinct. Carpel solitary, inferior, with one pendulous ovule.

37. *Compositæ.*—Calyx with a membranous or pap-

*Fig.* 80.

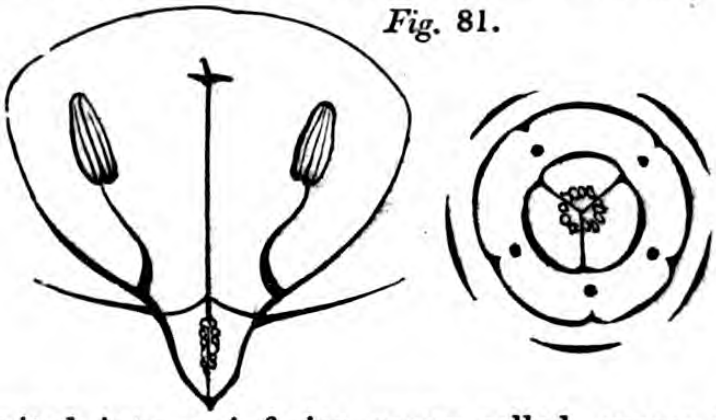


pose limb. Anthers united. Carpel solitary, inferior, with one erect ovule.

* When a calyx has its border divided into bristles, or hairs, or thin colourless scales, or feathery plumes, it is called *pappus*, or said to be in a *pappose* state.

38. *Campanulaceæ.*—Sepals, petals, and stamens, 5 each. Filaments broad, and valvate at the base. Car-

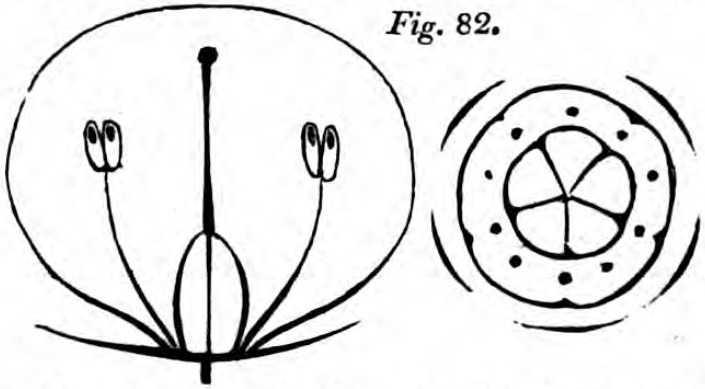
*Fig.* 81.



pels united into an inferior, many-celled, many-seeded pistil, with a thick hairy style.

39. *Ericaceæ.*—Sepals, petals, and stamens, $\frac{4}{4}$ or $\frac{5}{5}$;

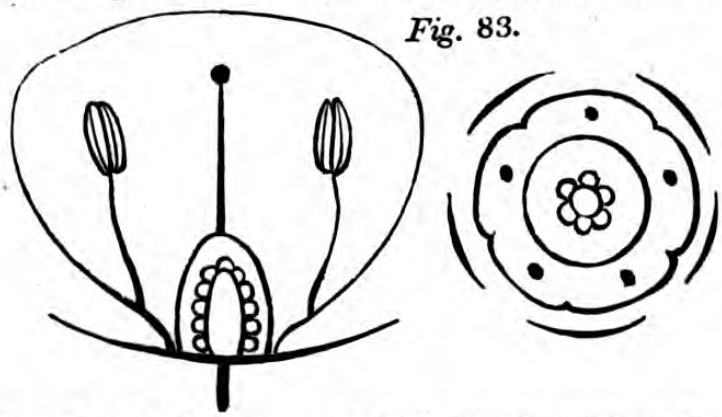
*Fig.* 82.



the latter hypogynous. Anthers opening by pores. Carpels united into a superior, many-celled, many-seeded pistil.

40. *Primulaceæ.*—Sepals, petals, and stamens, 5 each; the latter opposite the petals. Carpels united into a

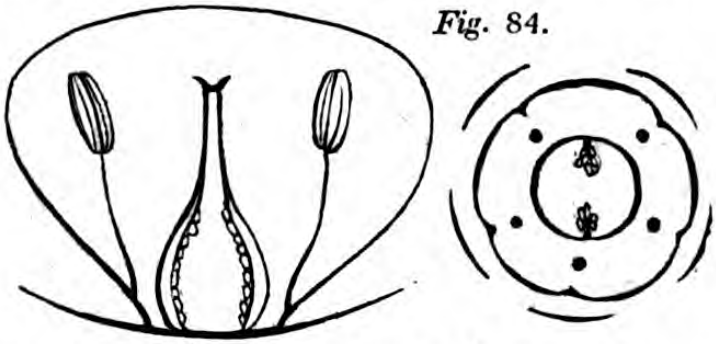
*Fig.* 83.



superior, 1-celled, many-seeded pistil, with a free central placenta.

41. *Gentianaceæ.* — Sepals, petals, and stamens, $\frac{4}{}$ or $\frac{5}{}$. Carpels united into a superior, 1-celled,

*Fig.* 84.



many-seeded pistil, with parietal placentæ. Leaves ribbed, and opposite.

42. *Convolvulaceæ.* — Sepals, petals, and stamens, 5 each; the first imbricated distinctly in 2 rows. Carpels

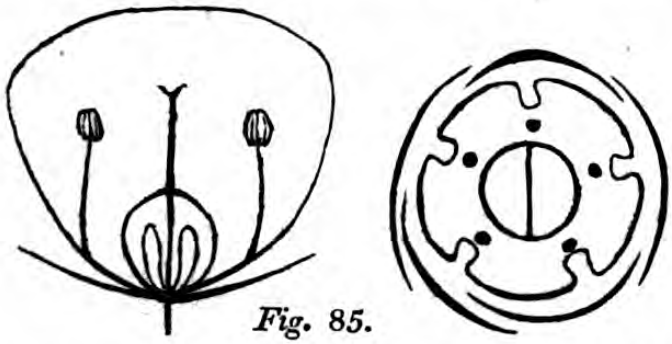


*Fig.* 85.

united into a superior, 2- or 3-celled, few-seeded, pistil, with erect ovules.

43. *Boraginaceæ.* — Sepals, petals, and stamens, 5

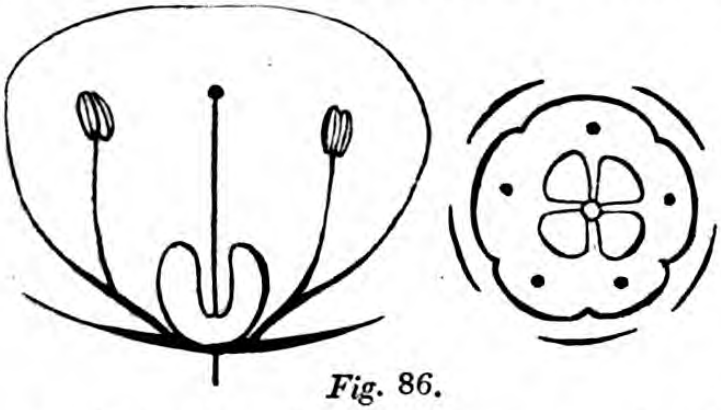
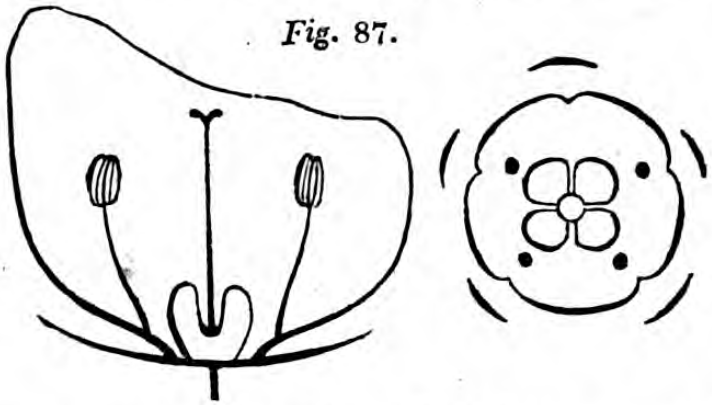


*Fig.* 86.

each; regular. Carpels united into a superior, 4-lobed ovary.

44. *Labiatæ.*—Sepals and petals 5 each, bilabiate.

*Fig.* 87.



Stamens 2 or 4. Carpels united into a superior, 4-lobed ovary.

45. *Solanaceæ.* — Sepals, petals, and stamens, 5 each.

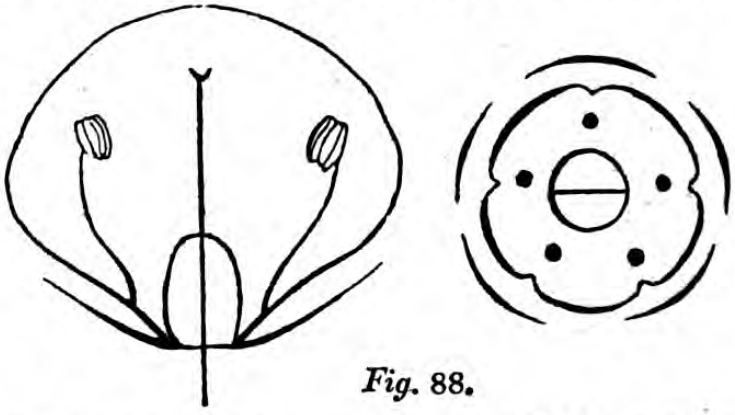


*Fig.* 88.

Carpels united into a superior, 2-celled, many-seeded pistil.

46. *Scrophulariaceæ.* — Sepals and petals 5 each,

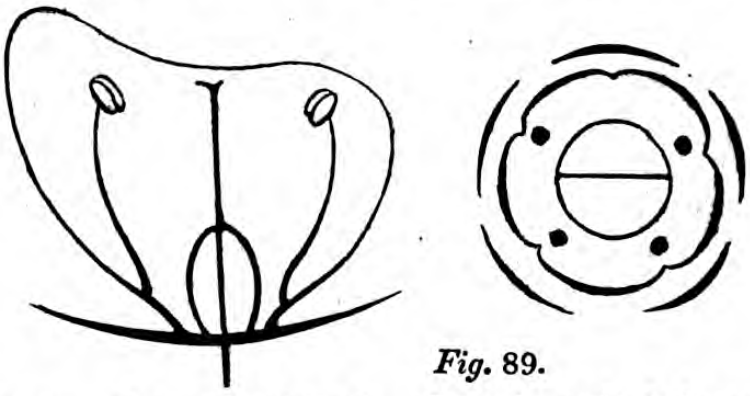
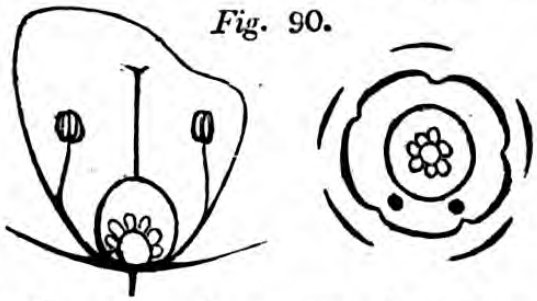


*Fig.* 89.

irregular. Stamens 2 or 4. Carpels united into a superior, 2-celled, many-seeded pistil.

47. *Lentibulaceæ.* — Sepals and petals 4 or 5 each, irregularly united. Stamens 2. Carpels united into a

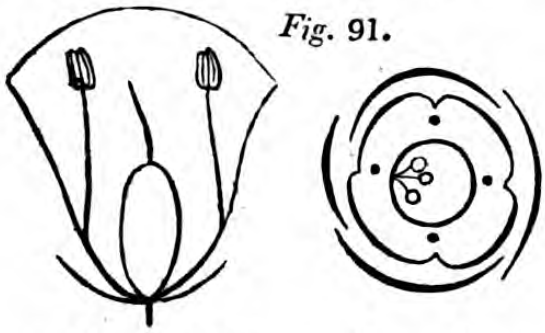
*Fig.* 90.



superior pistil, with a free, central, many-seeded placenta.

48. *Plantaginaceæ.*—Sepals, petals, and stamens, 4

*Fig.* 91.



each; the corolla very thin and membranous. Carpel solitary, superior, 1- or 2-celled, with a single stigma.

49. *Plumbaginaceæ.*—Sepals, petals, and stamens, 5

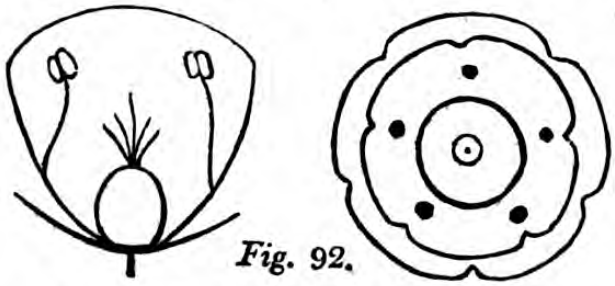


*Fig.* 92.

each; the first plaited. Carpel solitary, superior, 1-celled, with 5 stigmas.

TABULAR VIEW OF THE PRECEDING NATURAL ORDERS.

A. *Ovary inferior.*

*a.* Pistil 3-celled, many-seeded, with parietal placentæ. Fruit pulpy. Flowers unisexual *Cucurbitaceæ.*

*b.* Pistil 2-celled, with 1 style. Fruit hard. Stem round - - *Cornaceæ.*

*c.* Pistil 2-celled, with 2 styles. Fruit hard. Stem angular - - *Stellatæ.*

*d.* Pistil 3-celled, few-seeded. Filaments not valvular. Leaves opposite - *Caprifoliaceæ.*

*e.* Pistil many-seeded. Filaments valvate at the base - - *Campanulaceæ.*

*f.* Pistil 1-celled.

α. Anthers syngenesious - *Compositæ.*

β. Anthers free. Calyx naked *Valerianaceæ.*

γ. Anthers free. Calyx with an involucre *Dipsaceæ.*

B. *Ovary superior.*

*a.* Stamens hypogynous - *Ericaceæ.*

*b.* Stamens epipetalous. Flowers unsymmetrical.

α. Pistil 4-lobed - - *Labiatæ.*

β. Pistil not lobed, 2-celled, many-seeded *Scrophulariaceæ.*

γ. Pistil not lobed, with a free central placenta *Lentibulaceæ.*

*c.* Stamens epipetalous. Flowers symmetrical.

α. Pistil 4-lobed - - *Boraginaceæ.*

β. Pistil with a free central placenta. Stamens opposite the petals - *Primulaceæ.*

γ. Pistil many-seeded, with 2 parietal placentæ *Gentianaceæ.*

δ. Pistil many-seeded, with placentæ in the axis *Solanaceæ.*

ε. Pistil 2- or 3-celled, few-seeded, with erect ovules. Sepals 2 on the outside of the 3 others - - *Convolvulaceæ.*

ζ. Carpel simple, with 1 stigma *Plantaginaceæ.*

η. Carpel simple, with 5 stigmas *Plumbaginaceæ.*

## XXXI. CUCURBITACEÆ.

ESSENTIAL CHARACTER.—*Flowers* unisexual. *Calyx* 5-toothed. *Corolla* 5-parted, scarcely distinguishable from the calyx, very cellular, with strongly marked reticulated veins. *Stamens* 5, either distinct, or cohering in 3 parcels; *anthers* 2-celled, very long and sinuous. *Ovary* inferior, 1-celled, with 3 parietal placentæ; *style* short; *stigmas* very thick, velvety, or fringed. *Fruit* fleshy, more or less succulent, crowned by the scar of the calyx, 1-celled, with 3 parietal placentæ. *Seeds* flat, ovate.—*Stem* succulent, climbing by means of tendrils. *Leaves* palmated, or with palmate ribs, very succulent, covered with numerous asperities. *Flowers* white, red, or yellow.

*** These are climbing plants, with fleshy fruit, and unisexual yellow or green flowers. The Melon, Gourd, and Cucumber, also belong to the order.

### BRYONIA.

Flowers monœcious or dicœcious. Petals scarcely cohering at the base. — *Males.* Calyx 5-toothed. Stamens in 3 parcels. — *Females.* Styles 3-fid. Fruit succulent, with small, ovate, compressed seeds, which are more or less bordered. — Tendrils simple.

1. B. *alba* (*Bryony*). Leaves cordate, 5-lobed, toothed, with callous asperities. Flowers monœcious, in racemose corymbs. Female calyx as long as the corolla. ——— *Hedges.*

### ECBOLIUM.

Calyx 5-toothed. Corolla 5-parted. ♂ Stamens 5, in 3 parcels. ♀ Style trifid; stigmas bifid. Ovary 3-celled, many-seeded. Fruit muricated, when quite ripe expelling the seeds with force from the part where the stalk is inserted.

1. E. *Elaterium* (*Spirting Cucumber*). Tendrils none. Fruit hispid. Leaves cordate. ——— *Gardens.*

## XXXII. CORNACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 4, superior. *Petals* 4, oblong, broad at the base, inserted into the top

of the calyx, regular, valvate in æstivation. *Stamens* 4, inserted along with the petals, and alternate with them; *anthers* ovate-oblong, 2-celled. *Style* filiform; *stigma* simple. *Drupe* berried, crowned by the remains of a calyx, with a 2-celled stone. *Seeds* pendulous, solitary. — *Trees* or *shrubs*, seldom *herbs*. *Leaves* opposite, entire or toothed, with pinnate veins. *Flowers* capitate, umbellate, or corymbose.

CORNUS.

Calyx 4-toothed, deciduous. Petals 4. Stamens 4. Drupe with a 2-celled nut. — Erect deciduous shrubs or herbaceous plants, with simple leaves, and cymose or umbellate flowers.

1. C. *sanguinea* (*fig.* 93.) (*Dog-wood*). Branches straight. Leaves green on both sides. Cymes naked, flat. ——— *Hedges.* A deciduous shrub, with branches red in the winter.

*Fig.* 93.

## XXXIII. CAPRIFOLIACEÆ.

ESSENTIAL CHARACTER. — *Calyx* superior, with a small limb. *Corolla* monopetalous, 4- or 5-cleft. *Stamens* inserted on the corolla, distinct, equal in number to its segments, and alternate with them. *Ovary* 3-celled, with one ovule in one cell, and several pendulous ones in the two others. *Fruit* succulent. — *Trees, shrubs,* or *herbaceous* plants. *Leaves* opposite, without stipules. *Flowers* usually in cymes, or in few-flowered clusters; sometimes grown together at the base.

SAMBUCUS.

Calyx 5-cleft. Corolla rotate, 5-lobed. Stamens 5. Berry 3-seeded. — Upright deciduous shrubs, with cymose flowers and pinnated leaves.

1. S. *nigra* (*fig.* 94.) (*The Elder Tree*). Cymes with 5 main branches. Stipules obsolete. Leaflets ovate. Stem arboreous. ——— *Hedges and woods.*

*Fig.* 94.

### Viburnum.

Calyx 5-cleft. Corolla campanulate, 5-lobed. Stamens 5. Fruit succulent, 3-seeded. — Upright deciduous shrubs, with cymose flowers, and simple leaves.

1. V. *Tinus* (*The Laurustine*). Leaves ovate-oblong, entire, evergreen; axils of the veins bearded underneath. ——— *Gardens.*

2. V. *Lantana* (*Wayfaring Tree*). Leaves rugose, heart-shaped, serrated, veiny; downy beneath. ——— *Woods and gardens.*

3. V. *Opulus* (*fig.* 95.) (*The Guelder Rose*). Leaves lobed. Footstalks beset with glands. The exterior flowers radiant and neuter. ——— *Marshes.*

*Fig.* 95.

### Lonicera.

Calyx 5-toothed, deciduous. Corolla funnel-shaped, saccate at the base, with an erect 2-lipped limb. Stamens 5. Ovary 3-celled, with the cells equally many-seeded. Berry 2-celled, 2-seeded. — Upright deciduous shrubs, with simple leaves, and twin inodorous flowers.

1. L. *Xylosteum* (*The Fly Honeysuckle*). Stalks 2-flowered. Berries distinct. Leaves entire, downy, oval. ——— *Shrubberies.*

### Caprifolium.

Calyx 5-toothed, persistent. Corolla tubular, 2-lipped, usually saccate at the base. Stamens 5. Ovary 3-celled, with the cells equally many-seeded. Berry 1-celled, 1-seeded. — Twining shrubs, with simple leaves, and capitate fragrant flowers.

1. C. *perfoliatum* (*The Honeysuckle*). Flowers ringent, whorled, terminal. Leaves deciduous; the uppermost confluent and perfoliate. ——— *Woods and Hedges.*

2. C. *Periclymenum.* Heads of flowers ovate, imbricated,

terminal. Leaves all separate, deciduous. Flowers ringent. ——— *Gardens.*

## XXXIV. STELLATÆ, OR GALIACEÆ.

ESSENTIAL CHARACTER. — *Calyx* superior, 4- 5- or 6-lobed. *Corolla* monopetalous, rotate, or tubular, regular, inserted into the calyx; the number of its divisions equal to those of the calyx. *Stamens* equal in number to the lobes of the corolla, and alternate with them. *Ovary* simple, 2-celled; *ovules* solitary, erect; *style* simple; *stigmas* 2. *Fruit* a didymous, indehiscent pericarp, with 2 cells and 2 seeds. *Seeds* erect, solitary.—*Herbaceous* plants, with whorled *leaves*, destitute of *stipules;* angular *stems; flowers* minute.

*** These are small rough herbaceous plants, with minute white, yellow, or red flowers. Their angular stems and whorled leaves distinguish them among regular-flowered monopetalous orders.

### ASPERULA.

Corolla funnel-shaped, with 3 or 4 segments. Fruit dry, not crowned by the calyx.

1. A. *Cynanchica.* Leaves linear, 4 in a whorl; the upper ones very unequal. Flowers all 4-cleft. Fruit smooth. ——— *Woods.*

### RUBIA.

Corolla campanulate, spreading, 4- or 5-lobed. Stamens 4 or 5. Fruit succulent, double, smooth.

1. R. *tinctorum* (*Madder*). Leaves in fours or sixes, somewhat stalked, lanceolate, reticulated, furnished at the margin with prickles hooked backwards. ——— *Gardens.*

### GALIUM.

Corolla rotate, or campanulate, 5-cleft. Fruit dry, not crowned by the calyx.

1. G. *Aparine* (*Goosegrass, Whiptongue, Cleavers*). Leaves 8 in a whorl, lanceolate, keeled, rough, fringed with reflexed prickles. Stem weak. Fruit bristly. ——— *Hedges.*

2. G. *uliginosum.* Leaves 6 in a whorl, obovate-lanceolate, rigid, bristle-pointed; their edges rough like the stem, with recurved prickles. Fruit smooth, smaller than the corolla. ——— *Commons, heaths, and ditches.*

3. G. *verum.* Leaves 8 in a whorl, linear, channelled, entire, rough. Flowers in dense panicles. Fruit smooth. ——— *Dry banks.* Flowers yellow.

## XXXV. VALERIANACEÆ.

Essential Character. — *Calyx* superior; the *limb* either membranous, or resembling pappus. *Corolla* monopetalous, tubular, inserted into the top of the ovary, with from 3 to 6 lobes, either regular or irregular, sometimes calcarate at the base. *Stamens* from 1 to 5, inserted into the tube of the corolla, and alternate with its lobes. *Ovary* inferior, with 1 cell, and sometimes 2 other abortive ones; *ovule* solitary, pendulous; *style* simple; *stigmas* from 1 to 3. *Fruit* dry, indehiscent, with 1 fertile cell, and 2 empty ones. *Seed* solitary, pendulous.—*Herbs. Leaves* opposite, without stipules. *Flowers* corymbose, panicled, or in heads.

*** Among the three following orders this is known by the flowers having no involucre, and the stamens being distinct. In Dipsaceæ there is an involucre to each flower, and in Compositæ the anthers grow together into a tube.

### Valeriana.

Corolla regular, 5-lobed, without a spur. Stamens 3, otherwise as Centranthus.

1. V. *officinalis* (*Valerian*). Leaves all pinnate; leaflets lanceolate, nearly uniform. ——— *Meadows.*

2. V. *dioica.* Flowers diœcious. Stem-leaves pinnatifid; radical ones ovate. ——— *Meadows.*

### Centranthus.

Corolla 5-lobed, regular, without a spur. Stamen 1. Fruit 1-celled, crowned with the limb of the calyx, which changes into a feathery pappus.

1. C. *ruber* (*Red Valerian*). Leaves ovate-lanceolate, the

upper somewhat toothed. Spur much shorter than the tube, and twice as long as the ovary. ——— *Chalky cliffs and gardens.*

VALERIANELLA.

Corolla regular, 5-lobed, without a spur. Stamens 3. Fruit membranous, with 3 cells, crowned with the erect, not involute, limb of the calyx.

1. V. *olitoria* (*Lamb's Lettuce*). Stem weak. Leaves lanceolate, entire. Fruit naked, roundish, compressed, rather flat on each side. ——— *Gardens.*

## XXXVI. DIPSACEÆ.

ESSENTIAL CHARACTER.—*Calyx* superior, membranous, resembling pappus; surrounded by a scarious involucel. *Corolla* monopetalous, tubular, inserted in the calyx; *limb* oblique, 4- or 5-lobed, with an imbricated æstivation. *Stamens* 4, alternate with the lobes of the corolla; *anthers* distinct. *Ovary* inferior, 1-celled, with a single pendulous ovule; *style* 1; *stigma* simple. *Fruit* dry, indehiscent, 1-celled, crowned by the pappus-like calyx.—*Herbaceous* plants or *under-shrubs*. *Leaves* opposite or whorled. *Flowers* collected upon a common receptacle, and surrounded by a many-leaved *involucre*.

DIPSACUS.

Involucel with 4 sides, and 8 little excavations. Calyx with a somewhat cyathiform limb. Stigma longitudinal. Leaflets of the involucre longer than the bractea. Receptacle with spiny paleæ.

1. D. *fullonum* (*Teasel*). Leaves combined, serrated. Scales of the receptacle hooked backwards. Involucre reflexed. ——— *Hedges and fields.*

SCABIOSA.

Involucel nearly cylindrical, with 8 little excavations. Calyx with a limb consisting of 5 setæ, occasionally partially abortive.

1. S. *succisa* (*Devil's Bit*). Corolla in 4 equal segments. Heads nearly globular. Stem-leaves distantly toothed. ——— *Pastures.*

2. S. *columbaria.* Corolla in 5 unequal segments. Radical leaves ovate, or lyrate, notched; the rest pinnatifid, linear. ——— *Pastures.*

## XXXVII. COMPOSITÆ, OR ASTERACEÆ.

ESSENTIAL CHARACTER.—*Calyx* superior, completely united with the *ovary,* and undistinguishable from it; its *limb* either wanting, or membranous, divided into bristles, paleæ, hairs, or feathers, and called *pappus. Corolla* monopetalous, superior, either ligulate, i. e. spread flat, or tubular. *Stamens* equal in number to the teeth of the corolla, and alternate with them; the *anthers* cohering into a cylinder. *Ovary* inferior, 1-celled, with a single erect ovule; *style* simple; *stigmas* 2, either distinct or united. *Fruit* a small, indehiscent, dry pericarp, crowned with the limb of the calyx. *Seed* solitary, erect. — *Herbaceous* plants or *shrubs. Leaves* alternate or opposite, without stipules, usually simple. *Flowers* (called *florets*) unisexual or hermaphrodite, collected in dense *heads* upon a common *receptacle,* surrounded by an *involucre. Bracts* either present or absent; when present, stationed at the base of the florets, and called *paleæ of the receptacle.*

*** This is the largest of all the Natural Orders which systematic botanists have established, the genus Senecio alone consisting of nearly 600 species. In the European Flora there are three principal divisions, called *Corymbiferæ, Cynaraceæ,* and *Cichoraceæ;* of which the first two have most of their flowers tubular, the latter all of them ligulate; the first being distinguished from each other by the involucres of one being soft and unarmed, of the other hard or spiny. Their differences stand thus: —

§ 1. *Corymbiferæ.* Most of the florets tubular. Involucre soft and unarmed. Style not jointed.

§ 2. *Cynaraceæ.* Most of the florets tubular. Involucre hard or spiny. Style jointed at the end.

§ 3. *Cichoraceæ.* All the florets ligulate.

§ 1. CORYMBIFERÆ. *Most of the florets tubular. Involucre soft and unarmed. Style not jointed.*

EUPATORIUM.

Involucre cylindrical; scales imbricated, oval-oblong. Florets few, all tubular, hermaphrodite. Receptacle naked. Pappus pilose.

1. E. *cannabinum.* Leaves in 3 or 5 deep, lanceolate segments; the middle one longest. ——— *Ditches.*

TUSSILAGO.

Involucre simple; the scales membranous at the margin. Florets either flosculous or radiant; either all hermaphrodite, or hermaphrodite in the centre, female in the ray. Receptacle naked. Pappus hairy.

1. T. *Farfara* (*Coltsfoot*). Stalks single-headed, clothed with scaly bracteas. Flowers radiant. Leaves heart-shaped, angular, and toothed. ——— *Gravel pits and waste sandy places.*

BELLIS.

Involucre hemispherical, many-leaved, simple; scales lanceolate. Flowers radiant. Receptacle naked, conical. Pappus 0.

1. B. *perennis* (*Day's Eye, or Daisy*). Root creeping. Scapes radical, naked. ——— *Meadows and pastures.*

BIDENS.

Involucre with bracteolæ at the base; outer scales longer than the rest, and spreading. Flowers mostly floscular; florets all hermaphrodite, or, if ligulate in the ray, then female, or hermaphrodite. Receptacle flat, paleaceous. Pappus from 2 to 5 persistent awns.

1. B. *tripartita.* Leaves in 3 segments. Bracteas unequal. Bristles of the pappus 2 or 3, erect. ——— *Ditches.*

HELIANTHUS.

Involucre imbricated. Florets of the ray ligulate, neuter; of the disk tubular, hermaphrodite. Anthers not caudate. Achænia all of the same form. Pappus of two or many paleæ, deciduous. Receptacle plano-convex, paleaceous.

1. H. *annuus* (*Sunflower*). Leaves all cordate, 3-ribbed,

serrated. Peduncles thick. Flowers nodding. ——— *Gardens.*

### Pulicaria.

Involucre imbricated. Flowers radiant, with the ray yellow. Receptacle naked. Pappus hairy, simple.

1. P. *vulgaris.* Leaves clasping the stem, wavy. Stem much branched, hairy. Heads hemispherical; radius scarcely longer than the disk. ——— *Ditches.*

2. P. *dysenterica.* Leaves oblong, downy, clasping the stem with their heart-shaped base. Stem woolly, panicled. Scales of involucre bristle-shaped, hairy. ——— *Ditches.*

### Filago.

Involucre imbricated; scales equal, acuminate, scarious, discoloured, longer than the few-flowered head. Florets filiform, tubular, female in the circumference, hermaphrodite in tbe disk. Receptacle conical, toothed, tuberculated, or paleaceous.

1. F. *germanica.* Stem erect, proliferous, leaves lanceolate. Heads globose, many-flowered, lateral as well as terminal. Scales of involucre bristle-pointed. ——— *Heaths and waste places.*

### Antennaria.

Involucre imbricated, hemispherical; scales scarious, coloured. Flowers dicœcious. Florets all tubular. — *Males.* Anthers with 2 bristles at the base. Stigmas truncate. Pappus filiform or clavate.—*Females.* Florets filiform, with a minute limb. Pappus capillary.

1. A. *margaritacea.* Leaves linear-lanceolate, acute, loosely cottony on the upper side; densely underneath. Stem branched in the upper part. Panicles corymbose, level-topped. ——— *Gardens.*

### Artemisia.

Involucre ovate or round, imbricated. Florets all tubular; of the disk hermaphrodite, 5-toothed; of the ray slender, less numerous, entire, female. Receptacle naked or hairy. Pappus 0.

1. A. *Absinthium* (*Wormwood*). Leaves in many deep segments, clothed with close silky down. Heads drooping, hemispherical. Receptacle hairy. ——— *Gardens.*

2. A. *Abrotanum* (*Southernwood*). Stem shrubby, erect,

panicled. Leaves downy underneath, all stalked and without auricles at the base; segments extremely narrow. Heads hoary, roundish, drooping. ——— *Gardens.*

3. A. *vulgaris* (*Mugwort*). Leaves pinnatifid, flat, cut; downy beneath. Clusters simple. Heads ovate. Receptacle naked. ——— *Roadsides.*

4. A. *Dracunculus* (*Tarragon*). Stem herbaceous, erect. Leaves green, smooth, lanceolate-linear, undivided, the radical ones trifid at the point. Heads panicled, roundish, nodding. Scales of the involucre broad-elliptical: the inner scarious at the edge. ——— *Gardens.*

### Tanacetum.

Involucre hemispherical, imbricated. Florets all tubular; of the disk hermaphrodite, 5-lobed; of the ray female, 3-lobed. Receptacle naked. Pappus naked, entire.

1. T. *vulgare* (*Tansy*). Leaves doubly pinnatifid, deeply serrated, naked. ——— *Waysides.*

### Achillea.

Involucre ovate, imbricated. Flowers radiant; of the disk hermaphrodite, of the ray short, female, and few. Receptacle narrow, flat, paleaceous. Pappus 0.

1. A. *Millefolium* (*Yarrow*). Leaves doubly pinnatifid, hairy; segments linear, toothed, pointed. Stem furrowed. ——— *Waysides.*

### Anthemis.

Involucre hemispherical; scales nearly equal, scarious at the margin, imbricated. Flowers radiant; of the disk hermaphrodite; of the ray lanceolate, female. Receptacle conical, paleaceous. Pappus a membrane.

1. A. *nobilis* (*Chamomile*). Leaves doubly pinnate, semicylindrical, acute, a little downy. Stem procumbent. Paleæ membranous, obtuse, shorter than the florets. ——— *Commons.*

### Matricaria.

Involucre hemispherical, imbricated; scales obtuse. Flowers radiant. Receptacle naked, conical. Pappus 0.

1. M. *Chamomilla.* Leaves smooth, pinnate; leaflets linear, simple, or divided. Rays spreading. Scales of involucre dilated, bluntish. ——— *Waste places.*

### Chrsyanthemum.

Involucre hemispherical, imbricated; scales scarious at the margin. Flowers radiant. Receptacle naked. Pappus none, on a short membrane.

1. C. *Leucanthemum* (*Oxeye Daisy*). Leaves clasping the stem, oblong, obtuse, cut; pinnatifid at the base, radical ones obovate, stalked. ——— *Fields.*

### Senecio.

Involucre with bracteolæ at the base; the scales scorched at the apex. Flowers either flosculous or radiant. Receptacle naked. Pappus soft, hairy.

1. S. *vulgaris* (*Groundsel*). Heads dispersed, without rays. Leaves pinnatifid, toothed, obtuse, smoothish; clasping at the base. ——— *Everywhere.*

2. S. *Jacobæa* (*Ragwort*). Rays spreading, oblong, toothed. Leaves doubly pinnatifid, somewhat lyrate, with spreading, toothed, smooth segments. Stem erect. Fruit of the disk silky. ——— *Hedgerows and roadsides.*

§ 2. Cynaraceæ. *Most of the florets tubular. Involucre hard or spiny. Style jointed at the end.*

### Cirsium.

Involucre imbricated. Flowers hermaphrodite, all tubular. Filaments distinct. Pappus plumose, united into a ring at the base, deciduous. Receptacle hairy.

1. C. *lanceolatum.* Leaves decurrent, pinnatifid, hispid with variously spreading spinous lobes. Involucre ovate, shaggy. Stem furrowed, hairy. ——— *Waste places.*

2. C. *arvense.* Leaves sessile, pinnatifid, spinous, nearly smooth. Stem panicled, solid. Involucre ovate; outer scales spinous. Root creeping, tuberous. ——— *Commons and waste places.*

### Onopordum.

Involucre imbricated; scales pungent. Receptacle excavated like honeycomb. Fruit compressed, 4-cornered, furrowed transversely. Pappus hairy, deciduous; its hairs connected in a ring at the base.

1. O. *Acanthium.* Scales of involucre awl-shaped, spreading in every direction. Leaves ovate-oblong, sinuated, woolly on both sides. ——— *Waysides.*

### Centaurea.

Involucre imbricated; scales leafy, scarious, or spiny in various ways. Florets of the disk hermaphrodite; of the ray neuter, and larger than the others. Receptacle paleaceous; paleæ jagged. Fruit inserted obliquely at the base. Pappus hairy.

1. C. *Cyanus.* Scales of involucre serrated. Leaves linear-lanceolate, entire; lower ones toothed towards their base. ——— *Corn fields.*

2. C. *Scabiosa.* Scales of involucre ovate, fringed, somewhat downy. Leaves pinnatifid; segments lanceolate, roughish, partly toothed. ——— *Hedges and fields.*

3. C. *Jacea.* Scales of involucre membranous, torn; lower ones pinnatifid. Leaves linear-lanceolate; radical ones elliptic-lanceolate, toothed. Flowers radiant. ——— *Hedges and fields.*

## § 3. Cichoraceæ. *All the florets ligulate.*

### Lapsana.

Involucre with external bracteolæ; scales linear-lanceolate. Receptacle naked. Fruit quickly deciduous, not enveloped in the scales of the involucre. Pappus 0.

1. L. *communis.* Involucre of the fruit angular. Stem branched, panicled, leafy. Leaves ovate, stalked, toothed. Peduncles cylindrical, even. ——— *Waysides.*

### Cichorium.

Involucre of 8 scales, united at the base, and surrounded by 5 external bracteæ. Receptacle naked, or rather hairy. Pappus sessile, scaly, shorter than the fruit.

1. C. *Intybus* (*Succory*). Heads in pairs, each nearly sessile. Leaves runcinate. ——— *Waysides.*

2. C. *Endivia* (*Endive*). Heads in pairs, or more, sessile or stalked. Floral leaves broad-ovate, at the base cordate-amplexicaul. Pappus 4 times as short as the achænia. ——— *Gardens.*

### Taraxacum.

Involucre imbricated, with an external series. Flowers in many rows. Achænium somewhat compressed, rough with scales at the point, abruptly contracted into a filiform beak. Pappus pilose. Receptacle naked.

1. T. *Dens Leonis* (*Dandelion*). Achænia linear-obovate striated, rough with scales near the point. Leaves oblong, or linear-lanceolate, pinnatifid-runcinate or entire, toothed or entire. ——— *Waste places,* everywhere.

### Picris.

Involucre with small, linear-lanceolate, external bracteolæ. Fruit transversely striated. Pappus feathery, sessile, or nearly so.

1. P. *hieracioïdes.* Leaves lanceolate, many; radical ones toothed. Stem rough. ——— *Woods.*

### Hypochæris.

Involucre oblong, imbricated. Receptacle paleaceous. Pappus feathery, stipitate, or sessile in the disk.

1. H. *radicata.* Leaves runcinate, bluntish, rough. Stems branched, naked, smooth. Peduncles scaly. Pappus of all the seeds stalked. ——— *Pastures.*

### Lactuca.

Involucre oblong, imbricated; scales membranous at the margin. Receptacle naked. Pappus stipitate, hairy, soft, fugacious.

1. L. *sativa* (*Lettuce*). Leaves rough at the keel, amplexicaul, toothed, entire. Flowers panicled. Beak of the achænium white, as long or longer. ——— *Gardens.*

### Sonchus.

Involucre oblong, imbricated, ovate at the base. Receptacle naked. Fruit striated longitudinally. Pappus short, sessile, hairy.

1. S. *oleraceus* (*Sowthistle*). Peduncles cottony. Involucre smooth. Leaves runcinate, toothed; the keel prickly. ——— *Everywhere.*

### Hieracium.

Involucre imbricated. Receptacle naked, or with a few short hairs. Pappus hairy, sessile, generally dirty brown.

1. H. *Pilosella.* Leaves elliptical, entire; cottony beneath. Runners creeping. Stalks single-headed, naked. ——— *Woods and banks.*

2. H. *aurantiacum.* Leaves elliptical, acute, entire. Stalk

almost leafless, hairy, densely-corymbose, many-headed. Involucre shaggy. ——— *Gardens.*

3. H. *umbellatum.* Stem erect, leafy, almost solid, imperfectly umbellate. Leaves scattered, linear, slightly toothed, nearly smooth as well as the involucre. ——— *Meadows and pastures.*

## XXXVIII. CAMPANULACEÆ.

Essential Character.—*Calyx* superior, usually 5-lobed, persistent. *Corolla* monopetalous, inserted into the top of the calyx, usually 5-lobed, withering on the fruit, regular. *Æstivation* valvate. *Stamens* inserted into the calyx alternately with the lobes of the corolla, to which they are equal in number; *filaments* broad and valvate at the base; *anthers* 2-celled, distinct. *Ovary* inferior, with 2 or more polyspermous cells; *style* simple, covered with collecting hairs; *stigma* naked. *Fruit* dry, crowned by the withered calyx and corolla, dehiscing. *Seeds* numerous, attached to a placenta in the axis.—*Herbaceous* plants or *under-shrubs,* yielding a white milk. *Leaves* almost always alternate, simple, or deeply divided, without stipules. *Flowers* in racemes, spikes, or panicles, or in heads, usually blue or white, very rarely yellow.

*** The only European order likely to be mistaken for this is Lobeliaceæ, which is distinguished by the syngenesious anthers.

### Phyteuma.

Calyx 5-cleft. Corolla rotate, with a very short tube, and 5 long linear segments. Stamens 5. Stigma 3-parted. Capsule 3-celled, opening by lateral perforations. Flowers in spikes or heads.

1. P. *spicatum.* Radical leaves blunt, cordate-ovate, doubly toothed, with a winged foot-stalk; cauline linear-lanceolate, toothed, sessile. Bracts few, linear-lanceolate, acuminate, 4 times as short as the long spike. ——— *Gardens.*

### Campanula.

Calyx 5-cleft, sometimes with the recesses reflexed. Corolla campanulate, 5-cleft. Stamens 5, with the filaments broadest

at the base. Stigma 4- or 5-parted. Capsule 3- or 5-celled, opening by perforations towards the base.

1. C. *Rapunculus* (*Rampion*). Leaves wavy, crenate, roughish; radical ones elliptic-lanceolate. Stem angular; hairy below. Panicle compact. Calyx entire. ——— *Gardens.*

2. C. *Rapunculoides.* Leaves roughish; radical ones heart-shaped, crenate, stalked; uppermost sessile, lanceolate. Flowers drooping, unilateral, in a terminal, bracteated, upright cluster. Calyx reflexed. ——— *Gardens.*

3. C. *Trachelium.* Stem angular. Leaves lanceolate, partly heart-shaped, sharply serrated, bristly as well as the calyx. Stalks axillary, with few flowers. ——— *Gardens.*

4. C. *rotundifolia* (*Harebell*). Radical leaves heart-or kidney-shaped, serrated; stem-leaves linear, entire. ——— *Heaths and hedgerows.*

5. C. *Medium* (*Canterbury Bells*). Stem undivided, erect, leafy. Leaves lanceolate or linear, crenated. Flowers erect. Segments of the calyx lanceolate-ovate, roughly ciliated. ——— *Gardens.*

PRISMATOCARPUS.

Corolla rotate, with a flat limb. Capsule prismatical, 2- or 3-celled, dehiscing towards the top.

1. P. *Speculum* (*Venus's Looking-glass*). Stem erect, branched, divaricating; lower branches long, ascending. Leaves oblong, lower obovate. Flowers solitary. Segments of the calyx linear, length of the ovary and corolla. ——— *Gardens.*

## XXXIX. ERICACEÆ.

ESSENTIAL CHARACTER.—*Calyx* 4- or 5-cleft, nearly equal, inferior. *Corolla* hypogynous, monopetalous, 4- or 5-cleft, regular or irregular. *Stamens* definite, equal in number to the segments of the corolla, or twice as many, hypogynous, or scarcely inserted into the base of the corolla; *anthers* 2-celled, the cells hard and dry, separate either at the apex or base, where they are furnished with some kind of appendage, and dehiscing by a pore. *Ovary* surrounded at the base by a disk, or secreting scales, many-celled, many-seeded; *style* 1, straight; *stigma* 1, undivided or toothed, or 3-cleft. *Fruit* capsular, many-celled, with central placentæ.

*Seeds* indefinite, minute. — *Shrubs* or *under-shrubs*. *Leaves* evergreen, rigid, entire, whorled, or opposite, without stipules. *Inflorescence* variable, the pedicels generally bracteate.

*** The hypogynous stamens and anthers bursting by pores distinguish these among monopetalous orders. *Solanum*, which has similar anthers, but which does not belong to the order, has the stamens inserted in the corolla.

### Arbutus.

Calyx small, 5-parted. Corolla ovate, with a small 5-cleft revolute limb. Stamens 10, villous at base; anthers with 2 pores at the tip. Berry granular, 5-celled, many-seeded.

1. A. *Unedo* (*Strawberry Tree*). Stem arboreous. Leaves smooth, bluntly serrated. Panicle terminal. Berry with many seeds. ——— *Gardens.*

### Calluna.

Calyx of 4 coloured sepals, surrounded by 4 coloured bracteæ. Corolla campanulate, 4-cleft. Stamens 8. Capsule 4-celled, the dissepiments adhering to the axis, and with 4 valves dehiscing through the dissepiments.

1. C. *vulgaris* (*Ling, or Heather*). Leaves very small, scale-like, closely imbricated. ——— *Heaths.*

### Erica.

Calyx 4-parted. Corolla campanulate, often ventricose, 5-toothed. Stamens 8 Capsule with from 4 to 8 cells, and the same number of valves.

1. E. *Tetralix*. Anthers horned. Style nearly concealed. Corolla ovate, Leaves fringed, 4 in a whorl. Flowers in round tufts. ——— *Heaths.*

2. E. *cinerea*. Anthers crested. Style a little prominent. Stigma capitate. Corolla ovate. Leaves 3 in a whorl. ——— *Heaths.*

3. E. *vagans* (*fig.* 96.) (*Cornish Heath*). Leaves 3 or 4 in a whorl. Flowers axillary, crowded. Corolla campanulate. Anthers without awns, bifid, and as well as the style exserted. ——— *Heaths in Cornwall.*

Fig. 96.

Fig. 97.

4. E. *ciliaris* (*fig.* 97.). Leaves ovate, 4 in a whorl, fringed with glands. Flowers in terminal unilateral racemes. Corolla ovate, inflated. Anthers awnless, bifid, included. ——— *Bogs in Cornwall.*

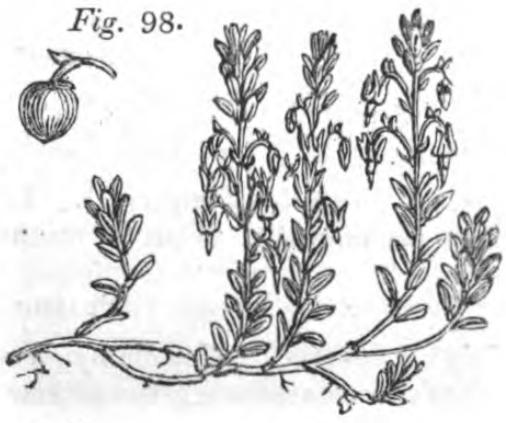
## Sub-Order Vaccinieæ.

Essential Character. — *Calyx* superior. *Corolla* monopetalous, lobed as often as the calyx. *Stamens* double the number of the lobes of the corolla, inserted into an epigynous disk; *anthers* with 2 horns and 2 cells, bursting by pores. *Ovary* inferior, many-seeded; *stigma* simple. *Berry* 4- or 5-celled; cells 1- or many-seeded. *Seeds* minute. — *Shrubs,* with alternate coriaceous leaves.

*** This sub-order, or order, differs from Ericaceæ in nothing except having an inferior ovary.

### Oxycoccus.

Fig. 98.



Corolla rotate, reflexed.

1. O. *palustris* (*fig.* 98.) (*Cranberry*). Stem filiform, creeping. Leaves evergreen, ovate, acute, ash-coloured beneath. Flowers on long stalks, nodding. ——— *Fens, among running water.*

### Vaccinium.

Corolla globose, or campanulate.

1. V. *Myrtillus* (*Bilberry*). Leaves deciduous, ovate, finely serrated, smooth. Branches angular. Peduncles axillary, 1-flowered, nodding. ——— *Heaths and moors.* Flowers pale green, tinged with pink. Berries black.

## XL. PRIMULACEÆ.

Essential Character. — *Calyx* divided, inferior, regular, persistent. *Corolla* monopetalous, hypogynous, regular; the *limb* 5-cleft, seldom 4-cleft. *Stamens* inserted upon the corolla, equal in number to its segments, and opposite them. *Ovary* 1-celled; *style* 1; *stigma* capitate. *Capsule* opening with valves; *placenta* central, distinct. *Seeds* numerous.—*Herbaceous* plants. *Leaves* usually opposite, either whorled or scattered.

*** No other monopetalous European plants have the stamens opposite the lobes of the corolla, unless they are more numerous than the lobes.

### Lysimachia.

Calyx 5-parted. Corolla rotate, 5-cleft. Stamens 5. Capsule globose, with 5 or 10 valves.

1. L. *vulgaris.* Clusters panicled, terminal. Leaves ovate-lanceolate, acute. ——— *Woods.*

2. L. *nemorum.* Leaves ovate, acute. Flowers solitary. Stem procumbent. Stamens smooth. ——— *Woods.*

3. L. *Nummularia* (*Moneywort*). Leaves somewhat heart-shaped. Flowers solitary. Stem prostrate, creeping. Stamens glandular. ——— *Woods.*

### Anagallis.

Calyx 5-parted. Corolla rotate, 5-lobed. Capsule globose, dehiscing by a transverse incision.

1. A. *arvensis* (*Pimpernel*). Leaves ovate, dotted beneath. Stem procumbent. Corolla minutely notched. ——— *Fields.*

### Primula.

Calyx 5-toothed. Corolla hypocrateriform; the limb 5-lobed, usually emarginate; the orifice dilated; the tube taper, as

long as the calyx or longer. Anthers usually tapering to the point. Capsule ovate, dehiscing at the apex, with 5 or 10 teeth. Seeds minute, very numerous.

1. P. *veris* (*fig.* 99.) (*Cowslip*). Leaves toothed, wrinkled, contracted towards the middle. Stalk many-flowered. Limb of the corolla concave. ——— *Meadows.*

2. P. *elatior* (*Oxlip*). Leaves toothed, wrinkled, contracted towards the middle. Stalk many-flowered. Limb of the corolla flat. ——— *Meadows.*

3. P. *acaulis* (*Primrose*). Leaves obovate-oblong, toothed, wrinkled. Stalks single-flowered. Limb of the corolla flat. ——— *Banks and woods.*

*Fig.* 99.

## XLI. GENTIANACEÆ.

Essential Character.—*Calyx* inferior, persistent. *Corolla* monopetalous, hypogynous, usually regular, and persistent; the limb divided, equal, its lobes of the same number as those of the calyx, generally 5, with an imbricated twisted æstivation. *Stamens* inserted upon the corolla, all in the same line, equal in number to the segments, and alternate with them. *Ovary* single, 1- or 2-celled, many-seeded; *style* 1, continuous; *stigmas* 1 or 2. *Capsule* or *berry* many-seeded, with 1- or 2-cells, generally 2-valved; the margins of the valves turned inwards. *Seeds* small. — *Herbaceous* plants, seldom *shrubs*, generally smooth. *Leaves* ribbed, without stipules; sessile, or having their petioles confluent in a little sheath. *Flowers* terminal or axillary.

*** No better mark than that of their ribbed leaves is required to recognise these plants among the other monopetalous orders of the European flora. In *Menyanthes trifoliata*, the leaves are 3-lobed, instead of being 3-ribbed.

### Gentiana.

Calyx 4- or 5-cleft. Corolla funnel-shaped, or hypocrateri-

form, 4- or 5-cleft, with the orifice naked. Stamens 5. Stigma 2-lobed. Seed not bordered.

1. G. *acaulis.* Flowers solitary, 5-cleft, bell-shaped, about as long as the quadrangular stem. ——— *Gardens.*

2. G. *Pneumonanthe.* Corolla bell-shaped, 5-cleft. Flowers stalked. Leaves linear. ——— *Bogs.*

3. G. *Amarella.* Corolla salver-shaped, 5-cleft; bearded in the throat. Segments of the calyx nearly equal. Stem flowering from top to bottom, with short axillary branches. ——— *Bleak heaths.*

### Erythræa.

Calyx 5-cleft. Corolla funnel-shaped, withering, with a short limb. Stamens 5. Anthers, when burst, becoming spiral. Style erect. Stigmas 2, roundish. Capsule linear.

1. G. *Centaurium.* Stem nearly simple. Panicle forked, corymbose. Leaves ovate-lanceolate. Calyx half the length of the tube; its segments partly combined by a membrane. ——— *Pastures.*

### Menyanthes.

Calyx 5-parted. Corolla funnel-shaped; the limb spreading, 5-parted, bearded internally, with a simple margin. Stamens 5. Style 1. Stigma capitate, with from 2 to 5 furrows. Glands 5, hypogynous, alternate with the stamens. Capsule 1-celled, 2-valved; the valves bearing the seed in their axis. — Leaves ternate.

M. *trifoliata* (*Buckbean*). Leaves ternate. Disk of the corolla densely shaggy. ——— *Bogs and ditches.*

## XLII. CONVOLVULACEÆ.

Essential Character. — *Calyx* persistent, in 5 divisions, remarkably imbricated, as if in more whorls than one, often very unequal. *Corolla* monopetalous, hypogynous, regular, deciduous; the limb 5-lobed, plaited. *Stamens* 5, inserted into the base of the corolla, and alternate with its segments. *Ovary* simple, with 2 or 4 cells, few-seeded, the ovules definite and erect; *style* 1, usually divided at the top; *stigmas* obtuse or acute. *Disk* annular, hypogynous. *Capsule* with the valves fitting, at their edges, to the angles of a loose

dissepiment, bearing the seeds at its base. — *Herbaceous* plants or *shrubs*, usually twining and milky, smooth, or with a simple pubescence. *Leaves* alternate, undivided, or lobed, seldom pinnatifid, with no stipules. *Inflorescence* axillary or terminal; *peduncles* 1- or many-flowered, the partial ones generally with 2 bracts.

*** The remarkably imbricated calyx and twining habit render it impossible for such plants of this order as belong to the European Flora to be mistaken, if the most ordinary attention is paid. Care, however, must be taken, to remember that there are many other orders containing twining plants.

### Convolvulus.

Calyx 5-parted, naked, or with 2 small bracteæ at the base. Corolla campanulate, with 5 plaits. Stamens shorter than the limb. Ovarium 2-celled, rarely 3-celled; cells 2-seeded. Style undivided. Stigmas 2, filiform. Capsule valvular.

1. C. *arvensis*. Leaves arrow-shaped, acute at each end. Stalks mostly single-flowered. ——— *Hedges*.

2. C. *tricolor*. Stem herbaceous, round, villous. Leaves lanceolate-obovate, somewhat spathulate, ciliated at the base. Peduncles 1-flowered, usually longer than the leaf. Calyx ovate-lanceolate, acute. Corolla 3-coloured. ——— *Gardens*. From Sicily.

### Calystegia.

Calyx 5-parted, enclosed in 2 foliaceous bracteæ. Corolla campanulate, with 5 plaits. Stamens nearly equal, shorter than the limb. Ovarium half 2-celled, 4-seeded. Style undivided. Stigmas 2, obtuse (taper or round). Capsule 1-celled.

1. C. *sepium* (*Bindweed*). Leaves arrow-shaped, abrupt at the posterior lobes. Stalks square, single-flowered. ——— *Hedges*.

## XLIII. BORAGINACEÆ.

Essential Character. — *Calyx* persistent. *Corolla* hypogynous, monopetalous, generally regular, 5-cleft,

sometimes 4-cleft. *Stamens* inserted upon the petals, equal to the number of lobes of the corolla, and alternate with them. *Ovary* 4-parted, 4-seeded; *style* simple, arising from the base of the lobes of the ovary; *stigma* simple or bifid. *Nuts* 4, distinct.—*Herbaceous* plants or *shrubs*. *Stems* round. *Leaves* alternate, covered with asperities, consisting of hairs proceeding from an indurated enlarged base. *Flowers* in 1-sided gyrate spikes or racemes, or panicles, sometimes solitary and axillary.

*** The four-lobed ovary in this order is so like that of Labiatæ that the student will not distinguish it. He is therefore to remember that in Boraginaceæ there is a 4-lobed ovary, symmetrical flowers, and alternate leaves; and in Labiatæ a 4-lobed ovary, unsymmetrical flowers, and opposite leaves.

### Borago.

Calyx 5-parted. Corolla rotate, 5-cleft, usually spreading. Scales of the orifice obtuse, emarginate. Nuts wrinkled.

1. B. *officinalis* (*Borage*). Limb of the corolla flat, much longer than the tube; mouth with a double row of valves, the innermost awl-shaped, bearing the stamens. ——— *Banks and gardens.* Flowers blue.

### Anchusa.

Calyx 5-cleft. Corolla funnel-shaped, 5-lobed; the limb erect; the lobes entire. The other characters of Lycopsis.

1. A. *italica.* Stem branched, erect. Leaves lanceolate, wavy, hispid, shining. Racemes double, with linear-lanceolate bracts. Calyx longer than the tube of the corolla. Scales of the corolla oblong, shaggy. ——— *Gardens.* Flowers dark blue.

### Lycopsis.

Calyx 5-cleft. Corolla funnel-shaped, 5-lobed; limb nearly erect; tube incurved. Scales of the orifice ovate, prominent, converging. Stigma emarginate. Nuts sculptured at the base.

1. L. *arvensis.* Leaves lanceolate, wavy, somewhat toothed,

very bristly. Stalks of the flowers and fruit erect. Limb of the corolla slightly unequal. ——— *Waste places.*

### Symphytum.

Calyx 5-cleft. Corolla cylindrical, campanulate; tube very short; limb ventricose, with 5 short lobes. Scales of the orifice subulate, converging.

1. S. *officinale* (*Comfrey*). Leaves ovate-lanceolate, decurrent, finely hairy. Stem branched. Anthers twice as long as their filament. ——— *Meadows and gardens.*

### Echium.

Calyx 5-parted. Corolla with a short tube; limb large, campanulate, obliquely 5-lobed: segments unequal; the 2 upper largest, the lowest small, acute, and reflexed. Nuts covered with little tubercles.

1. E. *vulgare.* Stem bristly and warty. Stem-leaves lanceolate, bristly, single-ribbed. Spikes lateral, deflexed, hairy. ——— *Waysides.*

### Myosotis.

Calyx 5-cleft, or 5-toothed. Corolla hypocrateriform, with a short tube; limb flat, with 5 emarginate lobes. Scales of the orifice convex, converging. Nuts smooth.

1. M. *palustris* (*Forget me not*). Nuts smooth. Leaves and calyx roughish, with close bristles. Clusters leafless. Calyx funnel-shaped, with short broad spreading teeth. Limb of the corolla horizontal, longer than the tube. Root creeping. ——— *Ditches.*

### Cynoglossum.

Calyx 5-parted. Corolla short, funnel-shaped, 5-lobed. Scales of the orifice convex, converging. Stigma emarginate. Nuts depressed.

1. C. *officinale* (*Hound's Tongue*). Stamens shorter than the corolla. Stem-leaves broadly lanceolate, downy, sessile. Flowers without bracts. ——— *Waysides.*

## XLIV. LABIATÆ, or LAMIACEÆ.

Essential Character. — *Calyx* tubular, inferior. *Corolla* monopetalous, hypogynous, bilabiate. *Stamens*

4, didynamous, inserted upon the corolla, the 2 upper sometimes wanting. *Ovary* deeply 4-lobed, seated in a fleshy hypogynous disk, the lobes each containing 1 erect ovule; *style* 1, proceeding from the base of the lobes of the ovary; *stigma* bifid, usually acute. *Fruit* 1 to 4 small nuts, enclosed within the persistent calyx.—*Herbaceous* plants or *under-shrubs*. *Stem* 4-cornered, with opposite ramifications. *Leaves* opposite, divided or undivided, without stipules, replete with receptacles of aromatic oil. *Flowers* in opposite, nearly sessile, axillary cymes, resembling whorls; sometimes solitary, or as if capitate.

### Lavandula.

Calyx unequally toothed, when in fruit closed. Upper lip of corolla bifid, lower trifid. Stamens enclosed. Anthers 1-celled, reniform, opening into the form of an orbicular cup.

1. L. *vera* (*Lavender*). Leaves oblong-linear or lanceolate entire; the younger hoary and revolute at the edge. Spikes interrupted. Bracts rhomboid, ovate acuminate. ——— *Gardens.* Very sweet scented.

### Mentha.

Corolla little longer than the calyx, 4-lobed; nearly equal; the upper lobe broadest and often emarginate. Stamens distant.

1. M. *viridis* (*Spearmint*). Spikes interrupted. Leaves sessile lanceolate, acute, naked. Bracteas bristle-shaped, somewhat hairy as well as the teeth of the calyx. Flower-stalks very smooth. ——— *Gardens.*

2. M. *rotundifolia.* Spikes interrupted, somewhat hairy. Leaves elliptical, obtuse, wrinkled, sharply crenate; shaggy beneath. Bracteas lanceolate. ——— *Ditches.*

3. M. *piperita* (*Peppermint*). Spikes blunt, interrupted below. Leaves stalked, somewhat ovate, smoothish. Calyx very smooth at the base. ——— *Ditches.*

4. M. *Pulegium* (*Penny Royal*). Flowers whorled. Leaves ovate. Stem prostrate. Flower-stalks and calyx all over downy; teeth of the latter fringed. ——— *Wet places.*

### Lycopus.

Calyx tubular, 5-cleft, with a naked orifice. Corolla tubular,

4-lobed, nearly equal; the upper lip broader and emarginate. Stamens 2.

1. L. *europæus.* Leaves stalked, ovate oblong, coarsely cut, pinnatifid at the base. Teeth of the calyx acuminate. Rudiments of sterile stamens wanting. ——— *Ditches.*

### Salvia.

Calyx somewhat campanulate, 2-lipped; the upper lip 3-toothed, the lower bifid; the orifice naked. Corolla ringent; the upper lip fornicate and emarginate. Stamens 2. Anthers with 2 cells, the one fertile, the other abortive, separated by a long linear connective.

1. S. *Verbenaca.* Leaves serrated, sinuated, smoothish. Corolla much more contracted than the calyx. ——— *Fields and waysides.*

2. S. *officinalis* (*Garden Sage*). Stem suffruticose; branches and younger leaves hoary. Leaves ovate-lanceolate and lanceolate, densely crenated, rugose. Bracts deciduous. Flowers purple. ——— *Gardens.*

### Origanum.

Calyx cylindrical, 5-toothed, when in fruit closed up with hairs. Corolla with a compressed tube; the upper lip erect, emarginate; the lower trifid, and nearly equal. Nuts roundish.

1. O. *vulgare.* Heads of flowers roundish, panicled, crowded, erect. Involucral leaves ovate, smooth. Calyx with 5 acute unequal teeth; throat hairy. ——— *Chalky downs.*

### Thymus.

Calyx striated; the orifice closed with hairs; the limb 2-lipped; the upper lip 3-toothed; the lower bifid, or with 2 bristles. Corolla short; the upper lip emarginate; the lower 3-lobed; the middle lobe being broadest and emarginate, or entire. Nuts smooth.

1. T. *vulgaris* (*Thyme*). Whorls of flowers in heads or racemes. Leaves linear or oblong-ovate, acute, with glandular dots, revolute at the edge, fascicled in the axis. ——— *Gardens.*

### Nepeta.

Calyx cylindrical, with a naked orifice. Corolla with a long tube; the orifice gaping; the upper lip emarginate; the lower

3-lobed; the lateral lobes very short, reflexed; the intermediate one larger, crenate, and concave.

1. N. *Cataria.* Whorls stalked, crowded into spikes. Leaves finely downy, heart-shaped, stalked, with tooth-like serratures. ——— *Hedges.* Flowers white.

2. N. *Glechoma* (*Ground Ivy*). Leaves crenated, reniform, the upper somewhat cordate. Teeth of the calyx ovate, awned, 3 times shorter than the tube. ——— *Woods and dry ditches.*

### Lamium.

Calyx 5-toothed, awned, naked, spreading at the point. Corolla longer than the calyx; its orifice inflated; the upper lip vaulted, entire; the lower with 2 small lateral lobes, and a large emarginate one in the middle. Anthers smooth. Nuts 3-cornered, smooth.

1. L. *album* (*White Dead-Nettle*). Leaves heart-shaped, pointed, strongly serrated, hairy. Flowers about 20 in a whorl. Tube of the calyx shorter than its teeth. Upper lip of the corolla notched; lateral teeth solitary, lanceolate. ——— *Banks*, &c.

2. L. *vulgatum* (*Red Dead-Nettle*). Leaves heart-shaped, bluntish, unequally crenate, stalked; the upper ones crowded. Stem leafless in the middle. Calyx teeth lanceolate. Tube of the corolla closed, near the bottom, with hairs. ——— *Waste places.*

### Stachys.

Calyx angular, 5-cleft, or 5-toothed, acuminate. Corolla with a short tube; the upper lip vaulted; the lower 3-lobed, with the sides reflexed. Stamens, after the anthers are burst, bent back on each side. Nuts obsoletely 3-cornered, ovate, or roundish.

1. S. *sylvatica.* Six flowers in a whorl. Leaves heart-shaped, stalked. Stem solid. ——— *Woods*, &c. Flowers brownish purple, spotted.

### Ballota.

Calyx campanulate, 5-cornered, with 10 streaks and 5 teeth. Corolla 2-lipped; the upper lip concave, crenate; the lower 3-lobed; the middle lobe larger and emarginate.

1. B. *nigra.* Leaves ovate, undivided, serrated. Calyx funnel-shaped, abrupt, with short spreading teeth. ——— *Dry*

*banks.* Flowers purple. Leaves with a heavy oppressive smell.

### Scutellaria.

Calyx short, with both lips entire; a concave scale lying upon the upper lip. Corolla longer, curved at the base; the upper lip compressed, vaulted, with 2 teeth at the base; the lower broad and emarginate. Nuts covered by the closed calyx.

1. S. *galericulata* (*Skull-cap*). Leaves lanceolate, crenate, rugged, heart-shaped at the base. Flowers axillary. ——— *Wet ditches.* Flowers blue.

### Prunella.

Calyx 2-labiate, with a naked orifice; the upper lip flat, somewhat truncate, 3-fid; the lower shorter, bifid. Corolla with the upper lip concave, entire, or 2-lobed; the lower 3-lobed; the middle lobe being larger than the rest, and emarginate. Filaments forked, or 2-toothed at the end; 1 tooth bearing the anther, the other naked. Nuts ovate, shining.

1. P. *vulgaris* (*Self-heal*). All the leaves ovate-oblong, stalked. Teeth of the upper lip of the calyx scarcely discernible. ——— *Commons, woods,* &c.

### Ajuga.

Calyx 5-cleft, nearly equal. Corolla tubular, labiate; the upper lip very small, and with 2 teeth; the lower 3-lobed, with a large intermediate obcordate lobe. Nuts reticulated.

1. A. *reptans* (*Bugle*). Almost smooth, with a solitary stem, and creeping runners. Lower lip of the corolla 4-cleft. ——— *Woods and shady banks.*

## XLV. SOLANACEÆ.

Essential Character.— *Calyx* 5-parted, persistent, inferior. *Corolla* monopetalous, hypogynous; the *limb* 5-cleft, regular, or somewhat unequal, in *æstivation* plaited or imbricated. *Stamens* inserted upon the corolla, as many as the segments of the limb, with which they are alternate; *anthers* bursting longitudinally, rarely by pores at the apex. *Ovary* 2-celled, with 2 polyspermous

placentæ; *style* continuous; *stigma* simple. *Pericarp* with 2, or 4, or many cells; either a capsule with a double dissepiment parallel with the valves, or a berry with the placentæ adhering to the dissepiment. *Seeds* numerous. — *Herbaceous* plants or *shrubs*. *Leaves* alternate, undivided, or lobed, sometimes collateral; the floral ones sometimes double, and placed near each other. *Inflorescence* variable, often out of the axil; the *pedicels* without bracts.

*** So far as the European Flora is concerned, this order is sufficiently characterised by its superior many-seeded ovary connected with regular flowers, and by the same number of stamens as there are lobes to the corolla, upon the side of which they grow. Solanaceæ differ from Ericaceæ in having epipetalous stamens; from Scrophulariaceæ in having regular symmetrical flowers; and from Gentianaceæ in the leaves not being ribbed, and in the placentæ being central.

### Solanum.

Calyx persistent, with from 5 to 10 divisions. Corolla monopetalous, rotate; the tube very short; the limb spreading, with 4, 5, or 6 divisions. Stamens 4, 5, or 6. Anthers oblong, opening by two pores at the apex. Berry roundish, with 2, 3, 4, or 6 cells. Embryo spiral.

1. S. *nigrum*. Stem herbaceous, without thorns, erect. Leaves ovate, bluntly toothed or wavy. Umbels lateral, drooping. ——— *Waste places*. Flowers white.

2. S. *Dulcamara*. Stem shrubby, zigzag, without thorns. Upper leaves hastate. Clusters cymose. ——— *Hedges*, &c. Flowers purple.

### Atropa.

Calyx campanulate, 5-cleft. Corolla campanulate, twice as long as the calyx, 5-lobed, equal. Filaments 5, filiform. Berry globose, seated in the calyx.

1. A. *Belladonna* (*Deadly Nightshade*). Stem herbaceous. Leaves ovate, undivided. Flowers solitary. ——— *Woods*. Flowers large, livid purple.

### Hyoscyamus.

Calyx tubular, 5-cleft. Corolla funnel-shaped; the limb spreading, obliquely 5-lobed, unequal. Stamens 5. Stigma capitate. Capsule compressed, furrowed on each side, opening at the apex by a transverse aperture.

1. H. *niger* (*Henbane*). Leaves sinuated, clasping the stem. Flowers sessile. ——— *Commons, waste places.* Flowers dull yellow, with purple veins.

### Datura.

Calyx tubular, ventricose, with 5 angles, 5-toothed, deciduous, leaving behind a broad orbicular base. Corolla funnel-shaped; the tube long; the limb with 5 angles, 5 plaits, and 5 points. Stamens 5. Stigma of 2 plates. Capsule echinate or smooth, 2-celled; the cells divided occasionally by spurious dissepiments.

1. D. *Stramonium.* Fruit spinous, ovate, erect. Leaves ovate, smooth, sinuated. ——— *Waste places.* Flowers large, white.

### Nicotiana.

Corolla funnel-shaped, with a plaited 5-lobed limb. Calyx permanent. Stigma capitate. Capsule 4-valved at the apex, 2- to 4-celled, many-seeded.

1. N. *rustica* (*Turkish Tobacco*). Stem round. Leaves stalked, ovate, entire. Tube of the corolla cylindrical, as long as the calyx, the limb with rounded segments. ——— *Gardens.* Flowers green.

## XLVI. SCROPHULARIACEÆ.

Essential Character. — *Calyx* inferior, persistent, often unequal. *Corolla* monopetalous, usually irregular; *limb* flat or erect, nearly equally divided or labiate. *Stamens* in a single series, 2 or 4, and not corresponding in number with the lobes of the corolla. *Ovary* superior, 2-celled, many-seeded; *style* simple or rarely bifid. *Fruit* capsular. — *Herbaceous* plants or *shrubs*, with exstipulate leaves. Very variable in their flowers.

*** The flowers are very like those of Labiatæ, but they have not a 4-lobed ovary: they also re-

semble a small order called Verbenaceæ, but are distinguished by their ovary containing more ovules than one in each cell.

### Scrophularia.

Calyx 5-lobed. Corolla globose; the limb contracted, 2-lipped; the upper lip 2-lobed, with an occasional intermediate scale; the lower shorter, and 3-lobed. Stigma simple. Capsule roundish acuminate; valves entire, turned inwards at the base.

1. S. *nodosa.* Leaves heart-shaped, acute, 3-ribbed at the base. Stem sharp-edged. Root tuberous. ——— *Ditches.*

2. S. *aquatica.* Leaves heart-shaped, bluntish, on decurrent foot-stalks. Stem winged. Root fibrous. ——— *Ditches.*

### Digitalis.

Calyx 5-parted, unequal. Corolla campanulate; the limb unequal, obliquely 4-lobed. Stigma simple or bilabiate. Capsule ovate, acuminate.

1. D. *purpurea* (*Foxglove*). Segments of the calyx ovate, acute. Corolla obtuse; its upper lobe scarcely cloven. Leaves downy. ——— *Waysides and gardens.*

### Antirrhinum.

Calyx 5-parted. Corolla without a spur, gibbous at the base; the tube inflated; the limb 2-lipped; the upper lip bifid and reflexed; the lower 3-lobed, with a projecting palate. Capsule oblique at the base, dehiscing by small holes at the apex.

1. A. *majus* (*Snapdragon*). Flowers in a dense cluster. Leaves lanceolate. Segments of the calyx ovate, obtuse. ——— *Old walls, gardens.*

### Linaria.

Calyx 5-parted; the 2 lower segments far apart from the rest. Corolla ringent, calcarate at the base; the tube inflated; the limb 2-lipped; the upper lip bifid, reflexed; the lower 3-lobed. Capsule ovate or globose, opening with several valves at the apex.

1. L. *vulgaris* (*Toadflax*). Leaves linear-lanceolate, crowded. Stem erect. Spikes terminal. Flowers imbricated.

Calyx smooth, shorter than the spur. ——— *Hedgerows, banks, woods.*

2. L. *Cymbalaria*. Leaves heart-shaped, 5-lobed, alternate, smooth. Stems procumbent. ——— *Gardens.*

### VERONICA.

Calyx 4- or 5-parted. Corolla rotate; the limb 4-parted, unequal, with entire lobes. Stamens 2. Capsule either separable in 2, or bearing the septa in the middle of the valves.

1. V. *Beccabunga* (*Brooklime*). Stem creeping. Leaves elliptical, flat, obtuse, crenated. Racemes axillary. Capsule roundish, slightly emarginate. ——— *Ditches.*

2. V. *officinalis* (*Speedwell*). Clusters lateral; partial stalks shorter than their bracteæ. Leaves elliptical, serrated, roughish. Stem procumbent. Stigma capitate. ——— *Commons, pastures, &c.*

3. V. *arvensis*. Flowers solitary, nearly sessile. Leaves cordate-ovate, deeply serrated; the floral ones lanceolate, entire. Pedicels erect. Seeds flat. ——— *Waste places.*

4. V. *hederifolia*. Flowers solitary, on long stalks. Leaves heart-shaped, flat, 5-lobed. Segments of the calyx heart-shaped, acute. Seeds cupped, wrinkled. Capsule 4-lobed, globose. ——— *Waste places.*

### OROBANCHE.

Calyx 1- or 2-parted, with from 1 to 3 bracteæ. Corolla tubular, ringent, 4- or 5-cleft. Stamens 4, didynamous. Ovarium surrounded by a fleshy disk. Style 1. Stigma capitate, emarginate, 2-lobed.

1. O. *major* (*Broom-rape*). Stem simple. Corolla inflated; upper lip slightly notched; lower with acute, nearly equal segments. Stamens quite smooth below. ——— *Heaths and fields; parasitic on the roots of plants.* A brown leafless plant.

### EUPHRASIA.

Calyx 4-cleft. Corolla tubular, 2-lipped; the upper lip galeate, emarginate; the lower 3-lobed, equal. Anthers 2 or 4, acuminate at the base. Capsule ovate, compressed, obtuse, emarginate.

1. E. *officinalis* (*Eyebright*). Leaves ovate, with about 5 teeth on each side; the lowermost teeth closer together than the others. Upper lip of corolla 2-lobed, lower trifid with emarginate segments. ——— *Meadows, woods, heaths.*

### Verbascum.

Calyx 5-parted Corolla rotate, 5-lobed, unequal. Stamens 5, unequal; filaments declinate, almost always villous at the base. Capsule with 2 valves, ovate, or globose.

1. V. *Thapsus* (*Mullein*). Leaves decurrent, crenate, woolly on both sides. Stem simple. Cluster dense. Flowers almost sessile. ——— *Waysides.*

2. V. *nigrum.* Leaves oblong-heart-shaped, stalked, waved, and crenate, slightly downy. Cluster mostly solitary. ——— *Waysides.*

## XLVII. LENTIBULACEÆ.

Essential Character. — *Calyx* persistent, inferior. *Corolla* monopetalous, hypogynous, irregular, bilabiate, with a spur. *Stamens* 2, included within the corolla, and inserted into its base; *anthers* 1-celled, sometimes contracted in the middle. *Ovary* 1-celled; *style* 1, very short; *stigma* bilabiate. *Capsule* 1-celled, many-seeded, with a large central placenta. — *Herbaceous* plants, living in water or marshes. *Leaves* radical, undivided; or compound, resembling roots, and bearing little vesicles. *Scapes* either with minute stipule-like scales, or naked; sometimes with whorled vesicles; generally undivided. *Flowers* single, or in spikes, or in many-flowered racemes; with a single bract, rarely without bracts.

### Pinguicula.

Calyx campanulate, 5-cleft. Corolla 2-lipped; the upper 3-lobed; the lower 2-lobed, shorter, and spurred. Stigma bilabiate.

1. P. *vulgaris* (*Butterwort*). Spur cylindrical acute, as long as the very irregular corolla. Segments of the calyx oblong. Capsule ovate. ——— *Bogs.* Flowers blue.

### Utricularia.

Calyx 2-leaved; the lips equal and undivided. Corolla personate; the lower lip spurred at the base. Stamens 2, the filaments bearing the anthers on their inner face at the top. Stigma bilabiate.

1. U. *vulgaris*. Spur conical. Stalk straight. Raceme somewhat corymbose. Upper lip of the corolla the length of the palate, reflexed at the sides. ——— *Bogs and wet ditches.* Flowers yellow.

## XLVIII. PLANTAGINACEÆ.

Essential Character. — *Flowers* usually hermaphrodite, very much imbricated. *Calyx* 4-parted, persistent. *Corolla* membranous, monopetalous, hypogynous, persistent, with a 4-parted limb. *Stamens* 4, inserted into the corolla, alternately with its segments; *filaments* filiform, flaccid, doubled inwards in æstivation; *anthers* versatile, 2-celled. *Ovary* sessile, without a disk, 2-, very seldom 4-celled, the cells caused by the growth of spurious dissepiments; *ovules* peltate or erect, solitary, twin, or indefinite; *style* simple, capillary; *stigma* hispid, simple, rarely half-bifid. *Capsule* membranous, dehiscing transversely. *Seeds* sessile, peltate, or erect, solitary, twin, or indefinite; *testa* mucilaginous; *embryo* in axis of fleshy albumen; *radicle* inferior; *plumula* inconspicuous. — *Herbaceous* plants, with inconspicuous flowers, often arranged in spikes.

*** The long weak stamens are in general an obvious mark of this order.

### Plantago.

Flowers hermaphrodite. Capsule with 2 or 4 cells, and 2 or several seeds.

1. P. *major*. Leaves ovate, smoothish, somewhat toothed, on longish foot-stalks. Flower-stalks round. Spike tapering. Seeds numerous. ——— *Banks and pastures.*

2. P. *lanceolata* (*Ribgrass*). Leaves lanceolate, entire, tapering at each end, woolly at the base. Flower-stalks angular. Spike ovate. ——— *Waste places, waysides, pastures.*

3. P. *Coronopus*. Leaves in many pinnate linear segments. Flower-stalks round. ——— *Waste places.*

## XLIX. PLUMBAGINACEÆ.

Essential Character. — *Calyx* tubular, plaited, persistent. *Corolla* monopetalous or 5-petalous, regular.

*Stamens* definite; in the monopetalous species hypogynous! in the polypetalous arising from the petals! *Ovary* superior, single, 1-seeded; *ovule* inverted, pendulous from the point of an umbilical cord, arising from the bottom of the cavity; *styles* 5! seldom 3 or 4; *stigmas* the same number. *Fruit* a nearly indehiscent utricule. *Seed* inverted. — *Herbaceous* plants or *undershrubs*, variable in appearance. *Leaves* alternate or clustered, undivided, somewhat sheathing at the base. *Flowers* either loosely panicled, or contracted into heads, flowering irregularly.

*** This order will not be mistaken, if attention is paid to its having 5 styles, and a 1-celled, 1-seeded superior ovary

### Armeria.

Calyx scarious, plaited, entire, Corolla monopetalous, or pentapetalous. Stamens 5, inserted on the lobes of the corolla. Styles 5. Fruit indehiscent. Flowers capitate, in solitary heads, surrounded by a common imbricated scarious involucre. Leaves radical, tufted.

1. A. *maritima* (*Common Thrift*). Leaves linear, flat, obtuse. Scape twice or 4 times as long as the leaves. Scales of the involucrum scarious, obovate, very obtuse, shorter than the flowers. Calyx hairy at the base, with 5 sharp teeth shorter than the corolla. ——— *Gardens.*

### Statice.

Flowers in loose panicles, arranged on one side of the branches in long rows, surrounded by scarious scales. Otherwise the same as Armeria.

1. S. *Limonium* (*Sea Lavender*). Stalks round. Spikes level-topped. Leaves elliptic-oblong, single-ribbed, smooth, with a nearly terminal bristle. ——— *Salt marshes.*

### Plumbago.

Calyx tubular, 5-toothed. Corolla monopetalous, funnel-shaped, 5-lobed. Stamens 5, hypogynous, dilated at the base. Style 1. Stigmas 5. Capsule opening at the point, 5-lobed.

1. P. *europæa* (*Leadwort*). Leaves amplexicaul, lanceolate, rough at the edge. Stem erect. Flowers small, pale purple. ——— *Gardens.*

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The following additional corollifloral orders are found in Europe, but they contain few species, and are of less importance than the preceding.

## AQUIFOLIACEÆ.

Essential Character.— *Sepals* 4 to 6, imbricated. *Corolla* 4- or 5-parted, hypogynous, imbricated. *Stamens* inserted into the corolla, alternate with its segments; *filaments* erect. *Disk* none. *Ovary* fleshy, superior, with from 2 to 6 cells; *ovules* solitary, pendulous; *stigma* subsessile, lobed. *Fruit* fleshy, indehiscent, with from 2 to 6 stones. — *Trees* or *shrubs*. *Leaves* alternate or opposite, coriaceous. *Flowers* small, axillary, solitary, or fascicled.

*** The *Holly-tree* (*Ilex Aquifolium*) is the only common plant belonging to this order, which has no very close resemblance to any other European group.

## EBENACEÆ.

Essential Character. — *Calyx* 3- to 6-cleft, permanent. *Corolla* deciduous, somewhat coriaceous; its *limb* with 3 or 6 divisions, imbricated. *Stamens* arising from the corolla, twice as many as the segments of the corolla, sometimes 4 times as many; *filaments* simple in the hermaphrodite species, generally doubled in the polygamous and diœcious ones. *Ovary* sessile, without any disk, several-celled, the cells each having 1 or 2 ovules pendulous from their apex; *style* divided, seldom simple; *stigmas* bifid, or simple. *Fruit* fleshy, round or oval, by abortion often few-seeded. — *Trees* or *shrubs*. *Leaves* alternate, without stipules, quite entire, coriaceous. *Inflorescence* axillary. *Peduncles* solitary.

*** A single species, the *Diospyrus Lotus*, inhabiting Switzerland, is sometimes found in gardens, where it forms a tree.

## PYROLACEÆ.

ESSENTIAL CHARACTER. — Most of the characters of Ericaceæ, but: *Disk* absent; *seeds* very minute, enclosed in a tubular reticulated skin, which is much larger than they are.

*** A few pretty little herbaceous plants, with white or pink flowers, and roundish coriaceous deep-green leaves, are occasionally met with in moist woods, especially in northern or subalpine situations. They all belong to the genus *Pyrola*.

## MONOTROPACEÆ.

ESSENTIAL CHARACTER. — The same as Pyrolaceæ, except: *Style* straight; *anthers* bursting longitudinally; *stems* leafless, or nearly so, but covered with fleshy scales. — *Parasitical* plants.

*** *Monotropa Hypopithys*, a colourless plant, found among half-decayed leaves in woods, is the only European species of this small order.

## LOBELIACEÆ.

ESSENTIAL CHARACTER. — The only differences between this order and Campanulaceæ are, that its flowers are irregular instead of regular, and the anthers at the same time syngenesious. It is a large order out of Europe, but is extremely uncommon in this quarter of the globe. A little water-plant called *Lobelia Dortmanna* is British.

## APOCYNACEÆ.

ESSENTIAL CHARACTER. — *Calyx* divided into 5, persistent. *Corolla* monopetalous, hypogynous, regular,

5-lobed, with contorted æstivation, deciduous. *Stamens* 5, arising from the corolla; *filaments* distinct; *anthers* 2-celled, opening lengthwise; *pollen* granular, globose, or 3-lobed, immediately applied to the stigma. *Ovaries* 2, polyspermous; *styles* 2; *stigma* 1. *Fruit* a double follicle. — *Trees* or *shrubs*, usually milky. *Leaves* opposite, sometimes whorled, seldom scattered, quite entire, often having ciliæ or glands upon the petioles, but with no stipules.

*** The *Periwinkles*, *Vinca major* and *minor*, common trailing shrubby evergreens, and an *Apocynum* or two, are the plants of this order which inhabit Europe. They are readily known by their opposite leaves, and bifollicular fruit, from all orders except Asclepiadaceæ; and from that order by their separate anthers having powdery pollen.

## ASCLEPIADACEÆ.

Essential Character. — *Calyx* 5-divided, persistent. *Corolla* 5-lobed, regular, with imbricated æstivation, deciduous. *Stamens* 5, inserted into the base of the corolla; *filaments* usually connate; *pollen* cohering in masses, and sticking to 5 processes of the stigma. *Ovaries* 2; *styles* 2, closely approaching each other, often very short; *stigma* common to both styles, dilated, 5-cornered, with corpusculiferous angles. *Follicles* 2. *Seeds* numerous, imbricated, pendulous, almost always comose. — *Shrubs*, or occasionally *herbaceous* plants, almost always milky, and often twining. *Leaves* entire, opposite, or whorled.

*** Scarcely known in Europe; a few species of *Cynanchum* inhabit the most southern kingdoms. The order is readily known by its waxy pollen, adhering in masses to the glandular angles of the stigma, and by its bifollicular fruit.

## OLEACEÆ.

Essential Character. — *Calyx* monophyllous, divided, persistent, inferior. *Corolla* 4-cleft, occasionally of 4 petals, sometimes without petals; *æstivation* valvate. *Stamens* 2. *Ovary* simple, without any hypogynous disk, 2-celled; the *cells* 2-seeded; the *ovules* pendulous and collateral. *Fruit* drupaceous, berried, or capsular, often by abortion 1-seeded. — *Trees* or *shrubs*. *Branches* usually dichotomous and ending abruptly by a conspicuous bud. *Leaves* opposite, simple, sometimes pinnated. *Flowers* in terminal or axillary racemes or panicles.

*** Several European plants belong to this order, which is known at once, by its regular diandrous flowers, from all other European groups, except *Jasminaceæ*, and from them by the corolla being valvate not imbricated. The *Lilac* (*Syringa vulgaris*), *Olive* (*Olea europæa*), *Privet* (*Ligustrum vulgare*), and *Phillyrea*, all common in gardens, belong to the order, as also does the *Ash-tree* (*Fraxinus excelsior*), which is, however, anomalous in its structure, having no corolla in the common species; the corolla does, however, exist in the *Manna Ash* (*Ornus rotundifolia*).

## JASMINACEÆ.

Essential Character. — These plants differ from Oleaceæ in having the corolla imbricated in æstivation, and erect ovules. The common white Jasmine (*Jasminum officinale*) sufficiently illustrates the structure of the remainder.

## POLEMONIACEÆ.

Essential Character. — *Calyx* monosepalous, permanent. *Corolla* hypogynous, regular, 5-cleft, im-

bricated. *Stamens* 5, inserted on the tube of the corolla. *Ovary* superior, 3-celled, with ascending or peltate ovules; *stigma* trifid. *Capsule* 3-valved, with a loculicidal dehiscence. ——— *Herbaceous* plants.

*** The only European genus is *Polemonium*, of which one species, *P. cæruleum*, or the *Jacob's Ladder*, also called *Greek Valerian*, a biennial with white or blue flowers, is common in gardens. The order differs from *Convolvulaceæ* in not having a broken-whorled calyx.

## GLOBULARIACEÆ.

Essential Character. — *Calyx* persistent, 5-cleft, usually equal, sometimes 2-lipped. *Corolla* hypogynous, tubular, labiate. *Stamens* somewhat didynamous; *anthers* reniform, bursting longitudinally, the 2 cells confluent into 1. *Ovary* superior, 1-celled, with a single pendulous *ovule*; *style* filiform, emarginate at the apex. *Fruit* small, indehiscent, pointed with the persistent style. — *Shrubs*, or small low *under-shrubs*, or perennial *herbs*. *Leaves* alternate, often fascicled, turning black in drying. *Flowers* collected in small heads, upon a convex paleaceous receptacle.

*** A few alpine species, only known in this country in curious botanical gardens, are all that the European Flora contains of this unimportant order.

## VERBENACEÆ.

Essential Character. — *Calyx* tubular, persistent, inferior. *Corolla* hypogynous, monopetalous, tubular, deciduous, generally irregular. *Stamens* usually 4, didynamous, seldom equal, occasionally 2. *Ovary* 2- or 4-celled; *ovules* erect or pendulous, solitary or twin; *style* 1; *stigma* bifid or undivided. *Fruit* nucamentaceous, composed of two or four nucules in a state of

adhesion. *Seeds* erect or pendulous. — *Trees* or *shrubs*, sometimes *herbaceous* plants. *Leaves* generally opposite, simple or compound, without stipules. *Flowers* in opposite corymbs, or spiked alternately; sometimes in dense heads; very seldom axillary and solitary.

*** The common *Vervain* (*Verbena officinalis*), a way-side weed, is all that the European Flora comprehends of this order, which differs from Labiatæ only in the 4 lobes of the ovary of that order being consolidated in this.

## ACANTHACEÆ.

Essential Character. — *Calyx* 5-leaved, very much imbricated. *Corolla* monopetalous, hypogynous, bearing the stamens, irregular; the *limb* 2-lipped. *Stamens* mostly 2, both bearing anthers; sometimes 4, didynamous. *Ovary* seated in a disk, 2-celled, the cells either 2- or many-seeded; *style* 1; *stigma* 2-lobed, rarely undivided. *Capsule* 2-celled, the cells 2- or many-seeded, bursting elastically with 2 valves. *Seeds* roundish, hanging by ascending processes of the placenta, hard, cup-shaped, or usually hooked.

*** Scarcely different from Scrophulariaceæ, except in the seeds having no albumen, and hanging to the placenta by indurated funiculi, and by the very much imbricated or broken-whorled calyx. *Acanthus*, consisting of Greek herbaceous plants, and the only European genus, is a bad type of the order, which is abundant in tropical countries, and hardly belongs to the European Flora.

# CHAP. VII.

## OF MONOCHLAMYDEOUS EXOGENS.

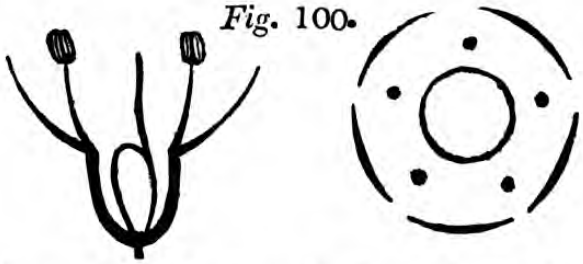
THE following are the most important orders of this sub-class in the Flora of Europe; viz. —

50. Sanguisorbeæ; 51. Chenopodiaceæ; 52. Polygonaceæ; 53. Elæagnaceæ; 54. Thymelaceæ; 55. Euphorbiaceæ; 56. Urticaceæ; 57. Corylaceæ; 58. Salicaceæ; 59. Betulaceæ; 60. Ulmaceæ; 61. Coniferæ.

The following short characters explain the distinctions between these orders: —

50. *Sanguisorbeæ.* Calyx tubular, lined with a disk, on the outside of which the few stamens are inserted.

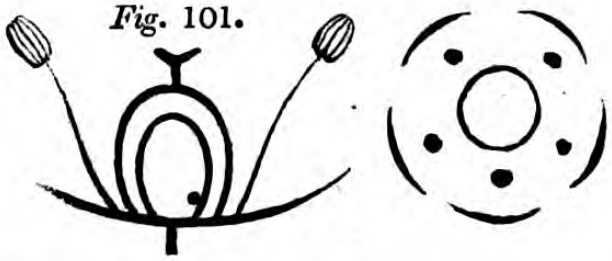
*Fig.* 100.



Carpel solitary, simple, 1-seeded; when ripe enclosed in the hardened tube of the calyx. Stipules leafy.

51. *Chenopodiaceæ.* Stamens opposite the sepals.

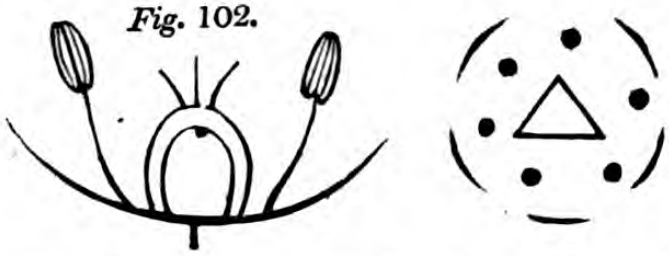
*Fig.* 101.



Carpel solitary, simple, 1-seeded; when ripe a utricle. No stipules.

52. *Polygonaceæ.* Stamens not regularly opposite the

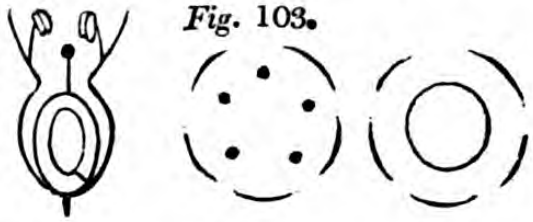
*Fig.* 102.



sepals. Carpel solitary, simple, 1-seeded; when ripe a 3-cornered nut. Stipules ochreate.

53. *Elæagnaceæ.* Flowers unisexual. Calyx tubular, with the stamens on its tube. Carpel solitary, simple,

*Fig.* 103.



with an ascending ovule; when ripe a nut enclosed within the succulent calyx. Leaves scurfy.

54. *Thymelaceæ.* Calyx tubular; with the stamens on its tube. Carpel solitary, simple, with suspended

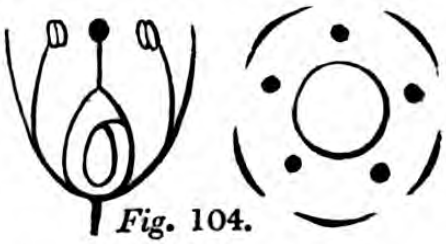
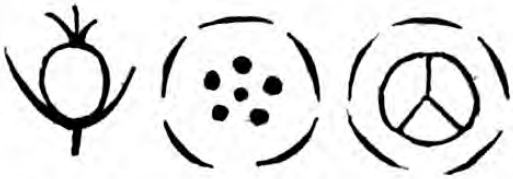


*Fig.* 104.

ovule, 1-seeded; when ripe a nut or a drupe. Leaves smooth.

55. *Euphorbiaceæ.* Flowers unisexual. Carpels 3,

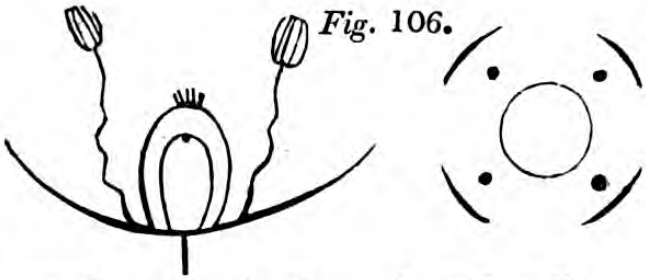
*Fig.* 105.



united into a pistil, which, when ripe, separates with elasticity into 3 shells or cocci.

56. *Urticaceæ.* Flowers unisexual. Stamens oppo-

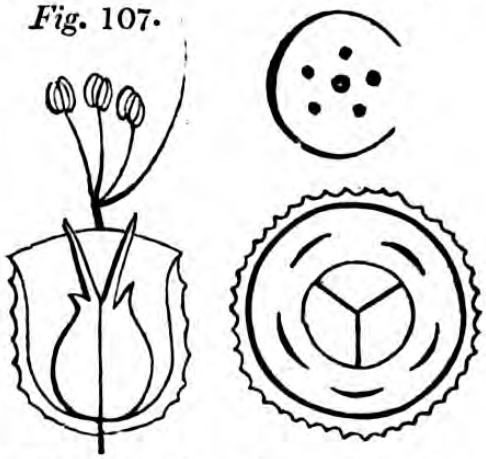
*Fig.* 106.



site the sepals, and elastic. Carpel solitary, simple, 1-seeded; when ripe an achænium.

57. *Corylaceæ.* Flowers unisexual; the males in amenta. Carpels 2 or more, inferior, united into a

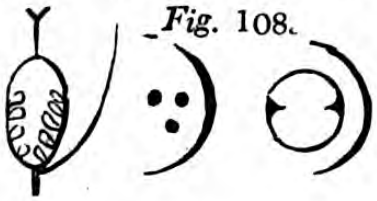
*Fig.* 107.



many-celled pistil, which, when ripe, becomes 1-celled and 1-seeded, and is enclosed in an involucel.

58. *Salicaceæ.* Flowers unisexual, amentaceous.

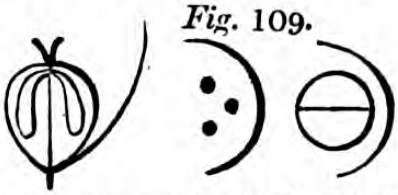
*Fig.* 108.



Carpels 2, united into a pistil, with numerous ovules, which, when ripe, become seeds tufted with fine hairs.

59. *Betulaceæ.* Flowers unisexual, amentaceous.

*Fig.* 109.



Carpels 2, united into a 2-celled pistil, which, when

ripe, becomes membranous, with a single seed in each cell.

60. *Ulmaceæ.* Flowers bisexual, not amentaceous. Calyx lacerated, membranous. Carpels 2, united into

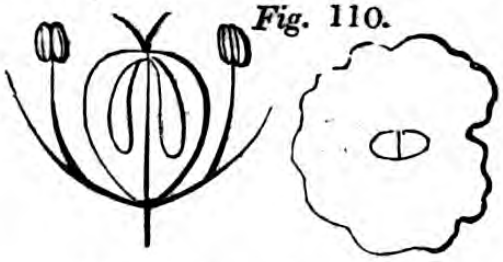


*Fig.* 110.

a 2-celled pistil, which, when ripe, becomes membranous, with a single seed in each cell.

61. *Coniferæ.* Flowers unisexual, amentaceous. Car-

*Fig.* 111.

pels opened out into scales, collected into cones or heads, or solitary, upon which grow the naked ovules.

## Tabular View of the preceding Natural Orders.

A. *Flowers not amentaceous.*

- *a.* Carpel solitary, simple.
  - α. Fruit a round nut, enclosed in the hardened tube of the calyx - *Sanguisorbeæ.*
  - β. Fruit a round nut, enclosed in the succulent tube of the calyx - *Elæagnaceæ.*
  - γ. Fruit a triangular naked nut *Polygonaceæ.*
  - δ. Fruit a naked drupe or round nut *Thymelaceæ.*
  - ε. Fruit a lenticular seed-like nut *Urticaceæ.*
  - ζ. Fruit a utricle - *Chenopodiaceæ.*
- *b.* Carpels more than one, consolidated.
  - α. Flowers unisexual. Carpels 3 *Euphorbiaceæ.*

β. Flowers bisexual. Carpels 2 *Ulmaceæ.*

B. *Flowers amentaceous.*

*a.* Carpels inferior, enclosed in an involucre *Corylaceæ.*

*b.* Carpels superior, closed up, many-seeded *Salicaceæ.*

*c.* Carpels superior, closed up, 2-seeded *Betulaceæ.*

*d.* Carpels opened out, with naked ovules *Coniferæ.*

## L. SANGUISORBEÆ.

Essential Character. — *Flowers* often unisexual. *Calyx* with a thickened tube and a 3-, 4-, or 5-lobed limb, its tube lined with a disk. *Stamens* definite, sometimes fewer than the segments of the calyx, and arising from its orifice. *Ovary* solitary, simple, with a style proceeding from the apex or the base; *ovule* solitary, always attached to that part of the ovary which is next the base of the style. *Nut* solitary, enclosed in the (often indurated) tube of the calyx. *Seed* solitary, suspended or ascending.—*Herbaceous* plants or *under-shrubs*, occasionally spiny. *Leaves* simple and lobed, or compound, alternate, with stipules. *Flowers* small, often capitate.

*** If petals were added to this order it would belong to Rosaceæ, with which it is therefore generally united.

### Alchemilla.

Calyx 4-toothed, with 4 external bracteolæ. Stamens 1 to 4. Nuts 1 to 2. Stigmas capitate. Seed suspended. — Herbaceous plants. Leaves palmate, lobed, or cut. Flowers herbaceous.

1. A. *vulgaris* (*Ladies' Mantle*). Leaves lobed, plaited serrated, the radicle reniform and half-orbicular. Flowers terminal, corymbose. ——— *Gardens.*

2. A. *arvensis* (*Parsley Piert*). Leaves flat, 3-lobed, cut, wedge-shaped at the base. Flowers axillary, clustered. ——— *Gravelly waste places.*

### Poterium.

Flowers monœcious or polygamous. Calyx 4-toothed, with 3 scales on the outside at the base. Stamens 20 to 30. Nuts 2. Stigma pencil-shaped. Seed suspended. — Herbaceous plants. Leaves unequally pinnate. Flowers in dense spikes.

1. P. *Sanguisorba* (*Burnet*). Stem somewhat angular, herbaceous. Leaves pinnated; leaflets ovate-roundish. Spikes globose. Calyx, when in fruit, bony, netted, with 4 obtuse angles. ——— *Pastures, gardens.*

## LI. CHENOPODIACEÆ.

Essential Character. — *Calyx* herbaceous, sometimes tubular at the base, persistent. *Stamens* inserted into the base of the calyx, opposite its segments. *Ovary* single, superior, or occasionally adhering to the tube of the calyx, with a single *ovule* attached to the base of the cavity; *style* in 2 or 4 divisions, rarely simple. *Fruit* membranous, sometimes baccate.—*Herbaceous* plants or *under-shrubs*. *Leaves* alternate without stipules, occasionally opposite. *Flowers* small, sometimes polygamous.

*** Distinguished from Urticaceæ by the want of stipules chiefly; from Polygonaceæ by the former character and the fruit not being triquetrous.

### Chenopodium.

Calyx 3-, 4-, or 5-parted, persistent, neither warted nor growing together after flowering. Stamens 5, or fewer. Style 2-fid. Stigmas 2 to 4. Fruit a thin utricle, containing a single polished brittle seed.

1. C. *album* (*Goosefoot*). Leaves rhomboid-ovate, jagged, mealy; entire towards the base, upper ones oblong entire. Fruit quite smooth. ——— *Waste places.*

2. C. *Bonus Henricus*. Leaves triangular-arrow-shaped, entire. Spikes terminal, compound, leafless. ——— *Waste places.*

### Beta.

Calyx 5-parted, half-adherent to the ovarium at the base. Stamens 5. Styles 2. Fruit reniform, enveloped in the capsular base of the calyx.

1. B. *vulgaris* (*Garden Beet*). Roots fusiform, very fleshy, biennial. Radical leaves ovate, obtuse, somewhat cordate; those of the stem rhomboid-ovate. Spikes leafy. ——— *Gardens.*

ATRIPLEX.

Polygamous, or often monœcious.—*Hermaphrodite.* Calyx 5-parted. Stamens 5. Pistillum usually defective.—*Female.* Calyx 2-parted; the segments parallel and close together, uniting after flowering, and forming a cover for the fruit. Style bifid. Fruit a utricle, with a single brittle seed.

1. A. *patula.* Stem herbaceous, spreading. Leaves triangular-lanceolate, somewhat halberd-shaped. Calyx of the fruit tuberculated at the sides. ——— *Waste places.*

2. A. *hastata.* Stem herbaceous. Lower branches straggling. Leaves whole-coloured, the lower triangular-hastate, deeply toothed, the uppermost entire, those between them hastate-lanceolate. Fruit cordate triangular, with acuminate teeth. ——— *Waste places.*

3. A. *hortensis* (*Garden Orache*). Stem herbaceous, erect. Leaves cordate-triangular, toothed, whole-coloured. Fruit roundish-ovate, shortly acuminate, netted, entire. ——— *Gardens.*

SPINACIA.

Flowers diœcious.—*Male.* Calyx 4-parted. Stamens 4, inserted in the bottom of the calyx.—*Female.* Calyx 2- or 3-cleft. Styles 4. Fruit consolidated with the hardened calyx.

1. S. *oleracea* (*Garden Spinage*). Leaves oblong-ovate. Fruit unarmed or spiny. ——— *Gardens.*

## LII. POLYGONACEÆ.

ESSENTIAL CHARACTER.—*Calyx* inferior, imbricated in æstivation. *Stamens* definite, inserted in the calyx. *Ovary* superior, with a single erect ovule; *styles* or *stigmas* several. *Nut* triangular, naked, or protected by the calyx. *Seed* with farinaceous albumen, rarely with scarcely any.—*Herbaceous* plants, rarely *shrubs*. *Leaves* alternate, their stipules cohering round the stem in the form of an ochrea; when young, rolled backwards. *Flowers* occasionally unisexual, often in racemes.

*** The 3-cornered fruit, and ochreate stipules, are certain signs of this natural order.

### Rumex.

Calyx 6-parted; the 3 outer segments somewhat cohering at the base; the 3 inner becoming enlarged after flowering. Stamens 6. Styles 3, reflexed. Stigmas 3, cut. Nut with 3 sharp angles. Embryo on one side. Radicle superior.

1. R. *obtusifolius* (*Dock*). Lower leaves cordate-ovate, obtuse, seldom roundish, slightly curled; the upper ovate-lanceolate, tapering to each end, obtuse, on long stalks. Flowering branches alternate, or rarely double. Whorls distant, many-flowered, axillary. Inner sepals becoming ovate, acute, entire, or with 2 or 3 slight teeth, each bearing a large tubercle. ——— *Waste places.*

2. R. *crispus*. Leaves wavy, curled, acute; the lower oblong-lanceolate, stalked. Flowering branches alternate, double or triple, simple or divided. Whorls somewhat clustered, many-flowered; the upper destitute of leaves. Inner sepals becoming roundish, cordate, entire, acute, with very large tubercles. ——— *Waste places.*

3. R. *Acetosa* (*Sorrel*). Flowers diœcious. Leaves oblong, arrow-shaped. Permanent sepals tuberculated. ——— *Meadows and pastures.*

### Polygonum.

Flowers hermaphrodite. Calyx monophyllous, divided, persistent, generally petaloid. Stamens definite, either equal in number to the segments of the calyx, or twice as many, but generally in part abortive. Fruit a 2- or 3-cornered, indehiscent, monospermous nut.

*Fig.* 112.

1. P. *amphibium*. Styles 2, united half way up. Stamens 6. Racemes dense, ovate-oblong, erect, on smooth stalks. Stipules fringed. ——— *Wet places.*

2. P. *Fagopyrum* (*fig.* 112.) (*Buckwheat*). Leaves heart-arrow-shaped. Stem nearly upright, without prickles. Angles of the fruit even. ——— *Fields, cultivated.*

3. P. *Hydropiper*. Styles 2, united half way up. Stamens 6. Racemes lax, interrupted, droop-

ing. Stem erect. Leaves lanceolate, wavy, without spots. ——— *Wet ditches, &c.*

4. P. *aviculare* (*Knot-grass*). Flowers axillary. Leaves elliptic-lanceolate, rough-edged. Ribs of the stipules distant. Stem procumbent, herbaceous. ——— *Dry places, gravel walks, &c.*

5. P. *Convolvulus.* Leaves heart-arrow-shaped. Stem twining, angular. Segments of the calyx bluntly keeled. ——— *Hedges and fields.*

## LIII. ELÆAGNACEÆ.

Essential Character. — *Calyx* inferior, coloured inside, 2- or 4-cleft, imbricated in æstivation. *Stamens* inserted into the throat of the calyx, equal in number to its divisions, or twice as many. *Ovary* enclosed in the tube of the calyx, superior, with a single erect ovule; *style* 1 ; *stigma* 1. *Fruit* a dry or fleshy drupe. — *Shrubs* or small *trees ;* the *leaves* covered over with scurfiness.

*** We have no shrubby plants with scurfy leaves in Europe, except such as belong to this order.

### Hippophae.

Flowers dicœcious. — *Male*, catkin-like, tetrandrous.— *Female*, axillary, solitary. Calyx tubular, bifid, and closed at the apex. Disk wanting. Fruit a nut, contained within a succulent calyx.

1. H. *Rhamnoïdes* (*fig.* 113.) (*Sea Buckthorn*). Leaves linear-lanceolate, alternate.—— *Sea coast.* A spiny shrub.

*Fig.* 113.

### Elæagnus.

Flowers hermaphrodite. Tube of calyx slender; limb campanulate, 4- or 5-cleft, the throat contracted by a fleshy ring. Stamens 4 or 5. Fruit drupe-like, formed of the fleshy calyx-tube, enclosing a long nut.

1. E. *angustifolia* (*Oleaster*). Leaves lanceolate, acute, entire, silvery on each side. Flowers axillary, stalked, erect, solitary or in threes. ——— *Gardens.* Flowers pale yellow, very sweet-scented.

## LIV. THYMELACEÆ.

ESSENTIAL CHARACTER. — Calyx tubular, inferior, with an imbricated æstivation. *Stamens* definite, inserted in the tube or its orifice, often 8, sometimes 4, less frequently 2; *anthers* 2-celled, dehiscing lengthwise in the middle. *Ovary* with one solitary pendulous ovule; *style* 1; *stigma* undivided. *Fruit* hard, dry, and nut-like, or drupaceous. — *Stem* shrubby, with tenacious bark. *Leaves* without stipules, alternate or opposite, entire. *Flowers* capitate or spiked, terminal or axillary, occasionally solitary.

### DAPHNE.

Calyx 4-lobed. Stamens 8. Style short, terminal. Berry with 1 cell, and 1 seed.

1. D. *Mezereum.* Flowers naked on the stem, sessile, about 3 together. Leaves lanceolate, deciduous. ——— *Gardens.* Flowers red or white.

2. D. *Laureola* (*Spurge Laurel*). Clusters axillary, simple, each of about 5 flowers, drooping, shorter than the smooth, obovate-lanceolate, evergreen leaves. Calyx obtuse. ——— *Woods.* Flowers green.

## LV. EUPHORBIACEÆ.

ESSENTIAL CHARACTER. — *Flowers* monœcious or diœcious. *Calyx* none, or lobed, inferior, with various glandular or scaly internal appendages. *Males: Stamens* definite or indefinite, distinct or monadelphous; *anthers* 2-celled. *Females: Ovary* superior, sessile, or stalked, 3-celled; *ovules* solitary or twin, suspended from the inner angle of the cell; *styles* 3; *stigma* compound, or single. *Fruit* consisting of 3 dehiscent cells, separating with elasticity from their common axis. — *Trees, shrubs,* or *herbaceous* plants, often

abounding in acrid milk. *Leaves* opposite or alternate, simple, rarely compound, usually with stipules. *Flowers* axillary or terminal, usually with bracts, sometimes enclosed within an involucre.

*** The fruit of this order is tricoccous; that is, it consists of 3 carpels, which, when ripe, separate from each other with some elasticity, opening by the edge next the axis; this, together with the unisexual flowers, distinctly marks the order.

### BUXUS.

Monœcious. Calyx 3- or 4-parted. — *Male.* Scale 2-lobed. Stamens 4, inserted about the rudiment of an ovarium. — *Female.* Scales 3, very small. Styles 3. Stigmas 3, obtuse. Fruit with 3 horns, 3 cells, and 6 seeds.

1. B. *sempervirens* (*Common Box*). Leaves ovate, convex. Footstalks slightly downy at the edges. Anthers ovate-arrow-shaped. ——— *Chalky hills.*

### EUPHORBIA.

Flowers collected in monœcious heads, surrounded by an involucre, consisting of one leaf with five divisions, which have externally 5 glands alternating with them. — *Males.* Naked, monandrous, articulated with their pedicel, surrounding the female, which is in the centre. — *Female.* Naked, solitary. Ovarium stalked. Stigmas 3, forked. Fruit hanging out of the involucre, consisting of 3 cells, bursting at the back with elasticity, and each containing 1 suspended seed.

1. E. *Helioscopia.* Annual. Leaves membranous, obovate-cuneate, obtuse, or emarginate, serrated towards the points, smooth, or occasionally with a few hairs. Whorl 5-cleft, rarely 4- or 3-cleft. Ovaries convex at the back, polished, smooth. Seeds obovate, sculptured, brown, not shining. ——— *Waste places, everywhere.*

2. E. *Lathyris.* Biennial. Leaves somewhat coriaceous, linear, sessile, rather acute, or obtuse, mucronate, entire, smooth. Whorl 4-cleft, rarely bifid, still more rarely 5-cleft. Glands lunate, 2-horned; the horns dilated and obtuse. Ovaries convex at the back, with a deep longitudinal furrow,

even, smooth. Seeds obovate, truncate at the base, rough, brown, not shining. ——— *Gardens.*

3. E. *Peplus.* Leaves membranous, roundish, tapering into the petiole, very blunt, entire, smooth. Whorl trifid, very seldom 5-fid. Glands lunate, with very long horns. Ovaries with a double-winged keel at the back, wrinkled and scabrous, smooth. Seeds obovate-cylindrical; 4 of the sides dotted in rows, 2 with a longitudinal furrow; greyish-white, not shining. ——— *Waste places.*

4. E. *Characias* (*fig.* 114.). A shrub. Leaves lanceolate. Umbel of many downy branches. Bracts broad, perfoliate, acute. Glands of the involucre lunate. Ovary rough. Seeds smooth. ——— *Gardens.*

*Fig.* 114.

MERCURIALIS. ☿

Diœcious, or occasionally monœcious. Calyx 3-parted.—*Males.* Stamens 9 to 12.—*Females.* Ovarium double, with two opposite furrows, and two sterile filaments proceeding from each furrow. Styles 2, forked. Fruit dry, consisting of 2 cells bursting with elasticity, and containing each 1 seed.

1. M. *perennis* (*Herb Mercury*). Stem perfectly simple. Leaves rough. Root creeping. ——— *Woods and dry ditches.*

## LVI. URTICACEÆ.

ESSENTIAL CHARACTER. — *Flowers* monœcious or diœcious. *Calyx* membranous, lobed, persistent. *Stamens* definite, distinct, inserted into the base of the calyx, and opposite its lobes; *anthers* turned backwards with elasticity when bursting. *Ovary* superior, simple; *ovule* solitary, erect or suspended; *stigma* simple. *Fruit* a simple indehiscent nut, surrounded by the membranous or fleshy calyx; or a fleshy receptacle, either covered by numerous nuts, lying among the persistent fleshy calyxes, or enclosing them within its cavity. — *Trees, shrubs,* or *herbs,* sometimes lactescent. *Leaves* alternate, usually covered either with asperities or stinging hairs, with membranous *stipules,* which are deciduous or convolute in vernation.

*** The unisexual flowers, simple lenticular fruit, and stipules, afford the essential characteristics of this order, which cannot well be mistaken for any except Chenopodiaceæ, and the plants of that order never have stipules, or rough, or stinging leaves.

### Urtica.

Monœcious, seldom dicœcious.—*Males* in loose racemes. Calyx 4-parted. Stamens 4.—*Females* in capitate racemes. Calyx 2-leaved. Ovarium 1. Stigma 1. Fruit 1-seeded, enclosed in the calyx.

1. U. *urens* (*Smaller Stinging Nettle*). Leaves opposite, elliptical, with about 5 longitudinal ribs. Clusters nearly simple. ——— *Waste places.*

2. U. *dioica* (*Larger Stinging Nettle*). Leaves opposite, heart-shaped. Clusters much branched, in pairs, mostly dicœcious. Roots creeping. ——— *Waste places.*

3. U. *pilulifera* (*Roman Nettle*). Leaves opposite, ovate, serrated; with transverse ribs. Fertile flowers in globular heads. ——— *Gardens.*

### Parietaria.

Flowers polygamous, surrounded by an involucre. Calyx 4-parted. Stamens 4. Ovarium 1. Style 1. Stigma 1. Fruit 1-seeded, covered by the lengthened calyx.

1. P. *officinalis* (*Pellitory*). Leaves lanceolate-ovate, without lateral ribs at the base. Involucre 3-flowered, with 7 ovate segments. Stem ascending. ——— *Old walls.*

### Cannabis.

Flowers dicœcious. — *Male.* Calyx 5-parted. Stamens 5. — *Female.* Calyx 1-leaved, slit on one side. Styles 2. Achænium lenticular, enclosed in the permanent calyx.

1. C. *sativa* (*fig.* 115.) (*Hemp*). A tall annual. Leaves digitate, serrated. ——— *Fields.*

*Fig.* 115.

### Humulus.

Dicœcious. — *Males.* Calyx 5-parted. Stamens 5. —*Females* in a lax membranous cone. Ovarium 1. Styles 2. Fruit 1-seeded. Embryo spiral.

1. H. *Lupulus* (*The Hop*). Stems climbing. Leaves stalked, scabrous, cordate, serrated, simple or 3-lobed. ——— *Hedges.*

### Ficus.

Flowers enclosed within fleshy heads, which have a scaly orifice.

1. F. *Carica* (*figs.* 116, 117.) (*The Common Fig*). Leaves cordate, palmate, scabrous above, downy on the underside. ——— *Gardens.*

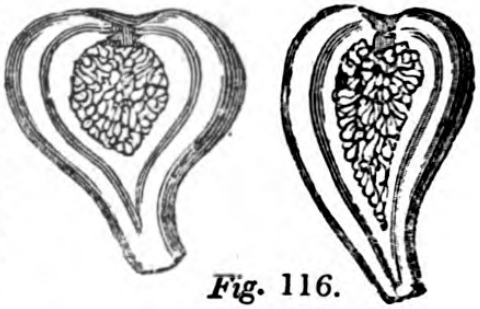


*Fig.* 116.

*Fig.* 117.

### Morus.

Monœcious. Calyx 4-parted.— *Males.* Stamens 4.— *Females.* Ovary 2-celled. Styles 2. Fruit composed of the receptacle, calyxes, and utriculi, all succulent and consolidated.

1. M. *nigra* (*The Mulberry Tree*). Leaves cordate, ovate, entire or lobed, serrated. Female catkins somewhat sessile, much longer than the peduncle. Calyx smooth at the edge. ———*Gardens.* Fruit deep purple.

## LVII. CUPULIFERÆ, or CORYLACEÆ.

Essential Character. — *Flowers* unisexual; males amentaceous, females aggregate or amentaceous. *Males: Stamens* 5 to 20, inserted into the base of the scales, or of a membranous calyx, generally distinct. *Females: Ovaries* crowned by the rudiments of a superior calyx, seated within a coriaceous involucre (*cupule*) of various figure, and with several cells and several ovules, the greater part of which are abortive; *ovules* twin or solitary, pendulous; *stigmas* several, sub-sessile, distinct. *Fruit* a bony or coriaceous 1-celled nut, more or less enclosed in the involucre. — *Trees* or *shrubs*. *Leaves* with stipules, alternate, simple, often with veins proceeding straight from the midrib to the margin.

*** The distinctive organ of this order is the cupule, which, in common language, is called *husk* in the Filbert, Chestnut, and Beech, and *cup* in the Oak.

### Fagus.

Monœcious. — *Males*. Catkins pendulous, globose, dense. Calyx 6-lobed. Stamens 8. — *Females* 2, enclosed in a spiny 4-lobed cupule. Stigmas 3. Ovarium 3-cornered, 3-celled. Nut by abortion 1-celled, 1- or 2-seeded.

1. F. *sylvatica* (*The Beech Tree*). Leaves ovate, shining, thin, obsoletely serrated. Prickles of the cupule simple. Stigmas 3. ——— *Woods*. A large tree, with a smooth bark.

### Castanea.

Polygamous. — *Male*. Catkins very long, with irregular clusters of flowers. Stamens from 5 to 20. — *Hermaphrodite*. Cupule generally 3-flowered, 4-lobed, spiny. Stamens 12, abortive. Ovarium 6-celled, with 2 ovules in each cell. Styles 6. Nut 1-celled, with from 1 to 3 seeds.

1. C. *vesca* (*fig.* 118.) (*The Sweet-Chestnut Tree*). Leaves oblong-lanceolate, acuminate, with mucronate serratures, smooth on each side. Cupules large, spiny. ——— *Plantations*. A large tree.

*Fig.* 118.

QUERCUS.

Monœcious. — *Male.* Catkin lax and pendulous. Stamens from 5 to 10. — *Female.* Cupule cup-shaped, covered with scales. Ovarium with 3 cells, 2 of which are abortive. Stigmas 3. Acorn 1-celled, 1-seeded, seated in the cup-shaped cupule.

1. Q. *pedunculata* (*fig.* 119.) (*Common Oak*). Leaves sessile, deciduous, oblong, wider towards the extremity; their sinuses rather acute, lobes obtuse. Fruit-stalks long. ——— *Woods.*

2. Q. *sessiliflora* (*fig.* 120.). Leaves on long stalks, deciduous, oblong, with opposite acute sinuses. Fruit sessile. ——— *Woods.*

3. Q. *Cerris* (*Turkey Oak*). Leaves deciduous, obovate, sinuate or pinnatifid, downy, with mucronated lobes. Cup of the acorn with long spreading narrow bracts. ——— *Plantations.*

4. Q. *Ilex* (*Evergreen Oak*). Leaves evergreen, ovate or lanceolate, mucronate, entire or serrated, shining above, hoary beneath. Bark even. ——— *Plantations.*

5. Q. *Suber* (*Cork Oak*). Leaves evergreen, ovate or lanceolate, mucronate, entire or serrated, hoary beneath. Bark corky, split into deep fissures. ——— *Plantations.*

*Fig.* 119.

*Fig.* 120.

CORYLUS.

Monœcious.— *Male.* Catkins cylindrical, with 3-lobed bracts, the middle lobe of which covers the 2 lateral ones. Stamens 8. Anthers 1-celled.— *Female.* Flowers numerous, enclosed in a scaly bud. Stigmas 2. Nut enclosed in a lacerated cupule.

1. C. *Avellana* (*The Hazel Nut*). Stipules ovate, obtuse. Leaves roundish, heart-shaped, pointed. Young branches hairy. Cupule shorter than the nut. ——— *Woods.*

CARPINUS.

Monœcious.— *Male.* Catkins long, cylindrical. Bracts ciliated at the base. Stamens from 8 to 14, somewhat bearded at the apex. — *Female.* Cones lax, membranous. Cupule scale-shaped, 3-lobed, 2-flowered. Ovarium with 2 cells, of which 1 is abortive. Stigmas 2. Nut long.

1. C. *Betulus* (*The Hornbeam Tree*). Cupule of the fruit flat, oblong, serrated, with two lateral lobes. ——— *Woods.* A small tree.

## LVIII. SALICACEÆ.

ESSENTIAL CHARACTER.— *Flowers* unisexual, either monœcious or dicœcious, amentaceous. *Stamens* dis-

tinct or monadelphous. *Ovary* superior, 1- or 2-celled; *ovules* numerous, erect, at the base of the cell, or adhering to the lower part of the sides; *style* 1 or 0; *stigmas* 2. *Fruit* coriaceous, 1- or 2-celled, 2-valved, many-seeded. *Seeds* either adhering to the lower part of the axis of each valve, or to the base of the cell, comose. — *Trees* or *shrubs*. *Leaves* alternate, simple, with deliquescent primary veins, and frequently with glands; *stipules* deciduous or persistent.

### Salix.

Flowers diœcious, very seldom monœcious. Catkins consisting of imbricated bracts. — *Males*. Stamens from 2 to 5; sometimes apparently single, in consequence of the cohesion of 2. — *Females*. Fruit a 1-celled follicle, with a gland at its base. Seeds comose.

1. S. *caprea* (*Sallow*). Stem erect. Leaves roundish-ovate, serrated, waved, pale and downy beneath. Stipules somewhat crescent-shaped. Catkins oval. Ovary stalked, ovate, silky. Stigmas nearly sessile, undivided. Fruit swelling. ——— *Woods and hedges*. A small tree.

2. S. *fragilis*. Leaves ovate-lanceolate, pointed, serrated throughout, very smooth. Footstalks glandular. Ovary ovate, abrupt, nearly sessile, smooth. Scales oblong, about equal to the stamens and pistils. Stigmas cloven, longer than the style. ——— *Woods*. A tree.

3. S. *Russelliana* (*Bedford Willow*). Leaves lanceolate, tapering at each end, serrated throughout, very smooth. Footstalks glandular, or leafy. Ovary tapering, stalked, longer than the scales. Style as long as the stigmas. ——— *Woods*. A tree.

4. S. *purpurea*. Branches trailing, decumbent. Leaves partly opposite, obovate-lanceolate, serrated, very smooth; narrow at the base. Stamen 1. Stigmas very short, ovate, nearly sessile. ——— *Woods*. A small shrub.

5. S. *vitellina*. Leaves lanceolate, acute, with cartilaginous serratures; smooth above, glaucous and somewhat silky beneath. Stipules minute, lanceolate, deciduous, smooth. Ovary sessile, ovate-lanceolate, smooth. Scales linear-lanceolate, acute, fringed at the base, longer than the pistil. ——— *Osier grounds*. A tree.

6. S. *alba* (*fig.* 121.). Leaves elliptic-lanceolate, pointed, serrated, silky on both sides; the lowest serratures glandular.

*Fig.* 121.

Stamens hairy. Ovary smooth, almost sessile. Stigmas deeply cloven. Scales rounded. ——— *Woods.* A large tree.

### Populus.

Diœcious. Catkins cylindrical with lacerated bracts.—*Male* Stamens from 8 to 30, arising out of a little oblique cup. — *Female.* Fruit a follicle, almost 2-celled by the rolling inwards of the margin of its two valves. Seeds comose.

1. P. *nigra* (*fig.* 123.) (*Black Poplar*). Leaves deltoid, pointed, serrated; smooth on both sides. Catkins all lax and cylindrical. Stigmas 4, simple, spreading. ——— *Woods.*


*Fig.* 122.




*Fig.* 123.


*Fig.* 124.




*Fig.* 125.

2. P. *alba* (*fig.* 122.) (*The Abele Tree*). Leaves lobed and toothed; somewhat heart-shaped at the base, snow-white

and densely downy beneath. Fertile catkins ovate. Stigmas 4. ——— *Woods.*

3. P. *canescens* (*fig.* 125.) (*The White Poplar*). Leaves roundish, deeply waved, toothed; hoary and downy beneath. Fertile catkins cylindrical. Stigmas 8. ——— *Woods.*

4. P. *fastigiata* (*The Lombardy Poplar*). Branches very erect, forming a long cylindrical head. Leaves somewhat deltoid, unequally serrated, smooth. ——— *Plantations.*

5. P. *tremula* (*fig.* 124.) (*The Aspen Tree*). Leaves nearly orbicular, toothed, smooth on both sides. Footstalks compressed. Young branches hairy. Stigmas 4, erect, auricled at the base. ——— *Woods.*

## LIX. BETULACEÆ.

Essential Character.—*Flowers* unisexual, monœcious, amentaceous; the males sometimes having a membranous lobed calyx. *Stamens* distinct, scarcely ever monadelphous; *anthers* 2-celled. *Ovary* superior, 2-celled; *ovules* definite, pendulous; *style* single, or none; *stigmas* 2. *Fruit* membranous, indehiscent, by abortion 1-celled. *Seeds* pendulous, naked.—*Trees* or *shrubs*. *Leaves* alternate, simple, with the primary veins often running straight from the midrib to the margin; *stipules* deciduous.

Fig. 126.

### Betula.

Monœcious. Catkins cylindrical.—*Males.* Bracts ternate, that in the middle bearing the stamens. — *Female.* Bracts 3-lobed, membranous, deciduous. Styles 2. Ovarium compressed, 2-celled; 1 cell abortive. Fruit membranous, winged, 1-celled.

1. B. *alba* (*fig.* 126.) (*Common Birch*). Leaves ovate, acute, somewhat deltoid, unequally serrated, nearly smooth. Branches erect; when young, pubescent. ——— *Woods.*

### Alnus.

Monœcious.—*Male.* Catkins cylindrical. Bracts stalked, cordate, with 3 smaller beneath them, which are staminiferous at the base. — *Female.* Catkins roundish-ovate. Bracts 2-flowered, coriaceous, persistent. Ovarium compressed. Stigmas 2. Fruit compressed, ovate, 2-celled, 2-seeded.

*Fig.* 127.

1. A. *glutinosa* (*fig.* 127.) (*Common Alder*). Leaves roundish-wedge-shaped, wavy, serrated, glutinous, rather abrupt; downy at the branching of the veins beneath. ——— *Marshes and sides of streams.*

## LX. ULMACEÆ.

**Essential Character.**— *Flowers* hermaphrodite or polygamous, never in catkins. *Calyx* divided, campanulate, inferior, irregular. *Stamens* definite, inserted into the base of the calyx; erect in æstivation. *Ovary* superior, 2-celled; *ovules* solitary, pendulous; *stigmas* 2, distinct. *Fruit* 1- or 2-celled, indehiscent, membranous or drupaceous. *Seed* solitary, pendulous. — *Trees* or *shrubs*, with scabrous, alternate, simple, deciduous leaves, and stipules.

### Ulmus.

Calyx campanulate, 4- or 5-toothed, persistent. Stamens from 3 to 6. Ovarium compressed. Stigmas 2, sessile. Pericarp membranous, winged, compressed, 1-seeded.

1. U. *campestris* (*fig.* 128.) (*Common Elm*). Leaves rhomboid-ovate, acuminate, wedge-shaped, and oblique at the base, always scabrous above, doubly and irregularly serrated, downy beneath, serratures incurved. Branches wiry, slightly corky; when young bright brown, pubescent. Fruit oblong, deeply cloven, naked. ——— *Woods.*

2. U. *montana* (*Witch Elm*). Leaves obovate, cuspidate, doubly and coarsely serrated, cuneate and nearly equal at the base, always exceedingly scabrous above, evenly downy beneath. Branches not corky, cinereous, smooth. Fruit rhomboid-oblong, scarcely cloven, naked. —— *Woods.*

3. U. *glabra* (*fig.* 129.) Leaves ovate-lanceolate, acuminate, doubly and evenly crenato-serrate, cuneate and oblique at the base, becoming quite smooth above, smooth or glandular beneath, with a few hairs in the axils of the veins. Branches bright brown, smooth, wiry, weeping. Fruit obovate, naked, slightly cloven. —— *Woods.*


*Fig.* 128. *Fig.* 129.

## LXI. CONIFERÆ, OR PINACEÆ.

ESSENTIAL CHARACTER. — *Flowers* monœcious or diœcious. *Males* monandrous or monadelphous; each floret consisting of a single *stamen,* or of a few united, collected, in a deciduous amentum, about a common rachis. *Females* in cones. *Ovary* spread open, and having the appearance of a flat scale destitute of style or stigma, and arising from the axil of a membranous bract. *Ovules* naked; in pairs on the face of the ovary, and consisting of 1 or 2 membranes open at the apex, and of a nucleus. *Fruit* consisting of a cone formed of the scale-shaped ovaries, become enlarged and indurated, and occasionally of the bracts also. *Seed* with a hard crustaceous integument.— *Trees* or *shrubs,* with a branched trunk abounding in resin. *Wood* with the ligneous tissue marked with circular disks. *Leaves* linear, acerose, or lanceolate, entire at the margins.

### Taxus.

Flowers diœcious or monœcious, surrounded by scales.—*Males.* Stamens 8 or 10, monadelphous.—*Females.* Nut enclosed in a succulent cup.

1. T. *baccata* (*The Yew Tree*). Leaves linear, distichous. Fruit roundish, bright red. ——— *Plantations and rocky woods.*

### Juniperus.

Diœcious or monœcious.—*Males.* Catkins ovate, with 4-8 1-celled anthers.—*Females.* Cone round, consisting of 3 fleshy scales growing together, and enclosing 3 bony nuts.

1. J. *communis* (*Juniper Bush*). Leaves 3 in each whorl, tipped with a spine, spreading, longer than the ripe fruit. ——— *Heathy downs.*

### Pinus.

Monœcious.—*Males.* Catkins with the scales each bearing 2 1-celled anthers at the ends.—*Females.* Catkins with acuminate scales. Ovaries 2. Cones with oblong clavate woody scales, with an angular termination. — Leaves 2 or more from the same sheath.

1. P. *sylvestris* (*fig.* 130.) (*Scotch Fir*). Leaves rigid, in pairs, glaucous. Young cones stalked, recurved. Crest of the anthers very small. ——— *Woods.*

2. P. *Pinaster* (*Cluster Pine*). Leaves in pairs, very long, stiff, and dark green. Cones large, sessile, clustered, recurved. ——— *Plantations.*

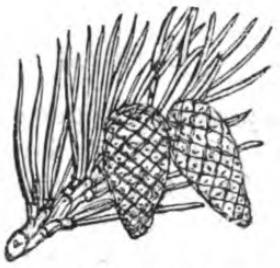


*Fig.* 130.

### Abies.

Scales of the cones flattened at the end, equal, not umbonate. — Leaves single.

1. A. *excelsa* (*The Spruce Fir*). Leaves evergreen, compressed, somewhat 4-cornered, mucronate, solitary. Cones cylindrical, pendulous. ——— *Plantations.*

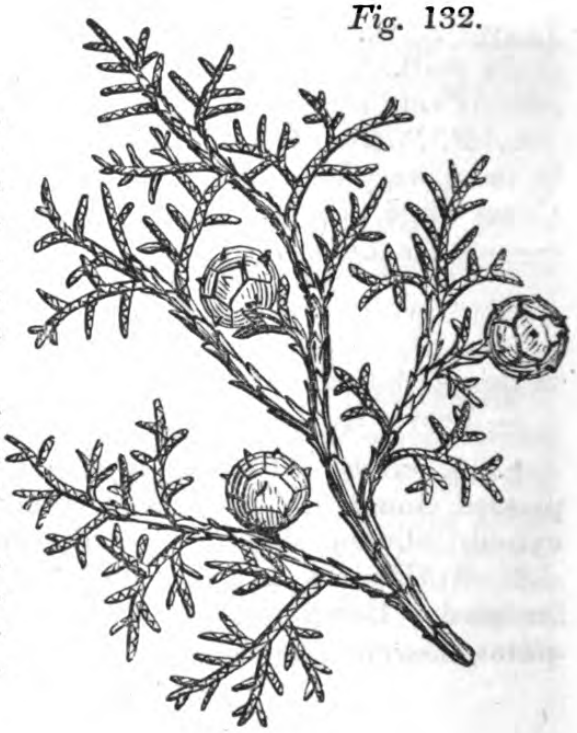
2. A. *Larix* (*fig.* 131.) (*The Larch*). Leaves deciduous, fascicled. Cones lax, ovate, erect. ——— *Woods and plantations.*

*Fig.* 131.

3. A. *Cedrus* (*The Cedar of Lebanon*). **Leaves evergreen, fascicled. Cones roundish, woody, very compact, erect.** ——— *Gardens.*

CUPRESSUS.

*Fig.* 132.



Flowers monœcious. Anthers 4, 1-celled, inserted on the lower side of a peltate scale. Cone dry, composed of woody peltate scales, with a projecting point in the middle.

1. C. *sempervirens* (*fig.* 132.) (*The Cypress Tree*). Branches erect; twigs quadrangular. Leaves imbricated in 4 rows, obtuse, appressed, convex. Cones subglobose. ——— *Gardens.*

The following natural orders of this subclass also belong to the Flora of Europe, but are of less importance than the preceding.

## LORANTHACEÆ.

Essential Character. — *Calyx* superior, with 2 bracts at the base. *Stamens* equal in number to the sepals, and alternate with them. *Ovary* 1-celled; *style* 1 or none; *stigma* simple. *Fruit* succulent, 1-celled. *Seed* solitary. — *Parasitical half-shrubby* plants. *Leaves* opposite, sometimes alternate, veinless, fleshy, without stipules. *Flowers* often monœcious, axillary or terminal, solitary, corymbose, or spiked.

*** This little order includes two European plants, the *Mistletoe* (*Viscum album*) and the *Loranthus europæus*. They approach Santalaceæ in some respects, but are readily known by their being true parasites with a soft viscid fruit.

## SANTALACEÆ.

Essential Character. — *Calyx* superior, half-coloured, with valvate æstivation. *Stamens* 4 or 5, opposite the segments of the calyx, and inserted into their bases. *Ovary* 1-celled, with from 1 to 4 *ovules*, fixed to a central placenta; *style* 1; *stigma* often lobed. *Fruit* 1-seeded, hard, dry, and drupaceous. — *Trees*, *shrubs*, *under-shrubs*, or *herbaceous* plants. *Leaves* alternate, or nearly opposite, undivided. *Flowers* small.

*** *Thesium*, a genus of herbaceous plants, of which one species, *T. linophyllum*, occurs in the chalky parts of England, and *Osyris alba*, a southern shrub, belong to the Flora of Europe, but are of no importance to the student. The order is distinguished from Elæagnaceæ by the fruit being inferior, and the leaves free from scurfs.

## LAURACEÆ.

Essential Character. — *Calyx* imbricated. *Stamens* opposite the segments of the calyx, the 3 innermost sterile or deficient; *anthers* bursting by a valve, from the base to the apex. *Glands* usually present at the base of the inner filaments. *Ovary* single, superior, with 1 or 2 single pendulous ovules; *style* simple; *stigma* obtuse. *Fruit* baccate or drupaceous. — *Trees* often of great size. *Leaves* without stipules, alternate, aromatic.

*** The only European plant is *Laurus nobilis*, the *Sweet Bay*, a shrub common in gardens. Like Berberaceæ this order has anthers opening by recurved valves, but there are no petals, and the leaves are aromatic.

## ARISTOLOCHIACEÆ.

Essential Character. — *Flowers* hermaphrodite. *Calyx* superior, tubular with 3 segments, which are valvate, regular, or very irregular. *Stamens* 6 to 10, epigynous. *Ovary* inferior, 3- or 6-celled; *ovules* numerous, horizontally attached to the axis; *style* simple, *stigmas* radiating, as numerous as the cells of the ovary. *Fruit* dry or succulent, 3- or 6-celled, many-seeded. — *Herbaceous* plants or *shrubs*, the latter often climbing. *Leaves* alternate, simple, stalked, often with leafy stipules. *Flowers* axillary, solitary, brown or some dull colour.

*** *Asarum europæum* a dwarf herbaceous plant with dingy brown flowers hidden beneath the leaves, and a few species of *Aristolochia*, make up the European part of this order, which resembles no other monochlamydeous Exogens in appearance, and which is readily known by its flowers being ☿ and the ovary inferior and many-seeded. *Aristolochia Clematitis*, an upright plant with light yellow flowers, is British, and is common in botanic gardens.

## AMARANTACEÆ.

Essential Character. — *Calyx* 3- or 5-leaved, hypogynous, scarious, persistent, generally immersed in dry coloured bracts. *Stamens* ♃, occasionally partly abortive; *anthers* either 2-celled or 1-celled. *Ovary* single, superior, 1- or few-seeded; the *ovules* hanging from a free central funiculus; *style* 1 or none; *stigma* simple or compound. *Fruit* a membranous utricle. — *Herbs*. *Leaves* simple, without stipules. *Flowers* in heads or spikes, usually coloured.

*** Very near Chenopodiaceæ, from which they chiefly differ in having scarious dry bracts, and flowers usually coloured brightly. The few European plants of the order are insignificant species of *Amaranthus*.

## SCLERANTHACEÆ.

Essential Character. — *Flowers* hermaphrodite. *Calyx* 4- or 5-toothed, with an urceolate tube. *Stamens* from 1 to 10, inserted into the orifice of the tube. *Ovary* simple, superior,

1-seeded. *Styles* 2 or 1, emarginate at the apex. *Fruit* a membranous utricle enclosed within the hardened calyx. — Small *herbs*. *Leaves* opposite, without stipules. *Flowers* axillary, sessile.

*** In Europe there are, of this obscure order, only two minute species of *Scleranthus*, found in dry pastures. They are near Illecebraceæ, but have neither petals nor stipules.

## EMPETRACEÆ.

Essential Character. — *Flowers* unisexual. *Sepals* hypogynous imbricated scales. *Stamens* equal in number to the inner sepals, and alternate with them; *anthers* roundish, 2-celled. *Ovary* superior, seated in a fleshy disk, 3-, 6-, or 9-celled; *ovules* solitary, ascending; *style* 1; *stigma* radiating. *Fruit* fleshy, seated in the persistent calyx, 3-, 6-, or 9-celled; the coating of the cells bony.—Small acrid *shrubs* with heath-like evergreen *leaves* without stipules; and minute *flowers* in their axils.

*** A heath-like plant, *Empetrum nigrum*, is not uncommon in shrubberies. It is at once recognised by being achlamydeous, and at the same time having a many-celled succulent fruit. Euphorbiaceæ, to which the order approaches most nearly, have a dry fruit in all the European species.

## MYRICACEÆ.

Essential Character. — *Flowers* unisexual, amentaceous, achlamydeous. *Males: Stamens* 6, rarely 8, somewhat monadelphous; *anthers* 2- or 4-celled, opening lengthwise. *Females: Ovary* 1-celled, surrounded by several hypogynous scales; *ovule* solitary, erect; *stigmas* 2, subulate, or dilated. *Fruit* drupaceous, often covered with waxy secretions.—*Leafy shrubs*, with resinous glands and dots, the leaves alternate, simple, with or without stipules.

*** The *Sweet Gale* (*Myrica Gale*), a fragrant shrub found in boggy commons and moors, represents in Europe this exotic order, which is very near Urticaceæ, but has not stipules, and has amentaceous achlamydeous flowers. It differs from Salicaceæ in the seed being solitary and not comose, and from Betulaceæ in the fruit not being 2-celled, but quite simple.

## CALLITRICHACEÆ.

ESSENTIAL CHARACTER.—*Flowers* usually unisexual, monœcious, naked, with 2 fistular coloured bracts. *Stamens* single; *filaments* filiform, furrowed along the middle; *anther* reniform, 1-celled, 2-valved. *Ovary* solitary, 4-cornered, 4-celled; *ovules* solitary, peltate; *styles* 2, subulate; *stigmas* simple points. *Fruit* 4-celled, 4-seeded, indehiscent.—Small aquatic *herbaceous* plants, with opposite, simple, entire *leaves*. *Flowers* axillary, solitary, very minute.

*** *Callitriche autumnalis* is a very common floating water-plant. The flowers are so small that they are unnoticed without careful inspection.

## CERATOPHYLLACEÆ.

ESSENTIAL CHARACTER. — *Flowers* monœcious. *Calyx* inferior, many-parted. *Male: Stamens* from 12 to 20; *filaments* wanting; *anthers* 2-celled. *Female: Ovary* superior, 1-celled; *ovule* solitary, pendulous; *stigma* filiform, oblique, sessile. *Nut* 1-seeded, indehiscent, terminated by the hardened stigma. *Seed* pendulous, solitary.—Floating *herbs*, with multifid cellular *leaves*.

*** This order consists of only one genus, *Ceratophyllum*, of which two inconspicuous species occasionally are found in Great Britain. Their affinity is uncertain.

## CYTINACEÆ.

ESSENTIAL CHARACTER. — *Flowers* monœcious at the top of a stalk covered with imbricated scales, the males uppermost, the females lowermost, in the axil of a bract, and supported on each side by a bractlet. *Males: Calyx* tubular-campanulate, 4-6-lobed, imbricated; *column* fleshy, covered by sessile, 2-celled anthers. *Females: Ovary* 1-celled, with many parietal placentæ, covered by myriads of minute ovules.

*** *Cytinus hypocistus*, a parasite upon the roots of species of Cistus, is a native of the south of Europe and unknown in England. It is a small simple-stemmed plant, every part of which is red, or reddish yellow.

## CHAP. VIII.

### OF ENDOGENS.

THESE plants are not divided by M. De Candolle into subclasses, but are all included in a single group. The principal orders in the Flora of Europe are the following, namely: —

62. Alismaceæ; 63. Butomaceæ; 64. Naiadaceæ; 65. Orchidaceæ; 66. Iridaceæ; 67. Amaryllidaceæ; 68. Liliaceæ; 69. Melanthaceæ; 70. Typhaceæ; 71. Araceæ; 72. Cyperaceæ; 73. Graminaceæ.

They may be briefly distinguished as follows: —

62. *Alismaceæ.* — Flowers tripetaloid* ; unisexual or

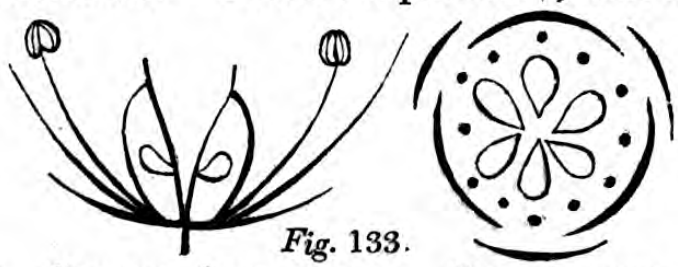


*Fig.* 133.

bisexual. Stamens hypogynous. Carpels several, distinct, with 1 or 2 seeds in each.

63. *Butomaceæ.* — Flowers in some measure tripetaloid. Stamens hypogynous. Carpels several, distinct,

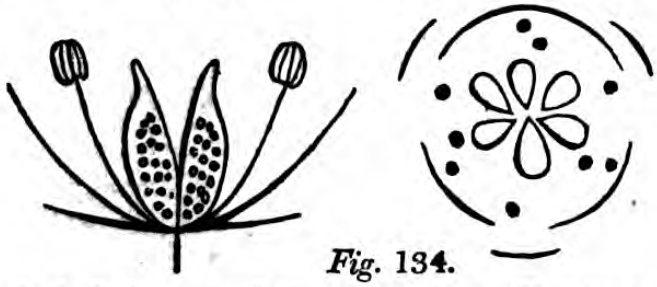


*Fig.* 134.

with an indefinite number of ovules adhering to their inner surface.

* Τρεις, *three*, and πεταλον, *a petal*. This term is employed in Endogens when the 3 sepals are green and in their usual state, the 3 petals only resembling the parts so called in other flowers. It is used in distinction to hexapetaloid, which indicates those flowers which have the sepals large and resembling the petals in colour and texture.

64. *Naiadaceæ.* — Sepals and petals minute, in a power of 2, deciduous, alike. Stamens in a corre-

*Fig.* 135.

sponding number. Carpels distinct, 1-seeded, the same number as the stamens, or fewer.

65. *Orchidaceæ.* — Flowers hexapetaloid, irregular.

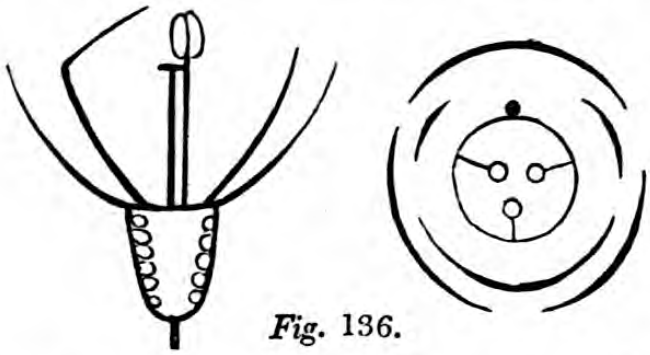


*Fig.* 136.

Stamen and style consolidated into a central column. Ovary inferior with parietal placentæ.

66. *Iridaceæ.* — Flowers hexapetaloid. Stamens 3,

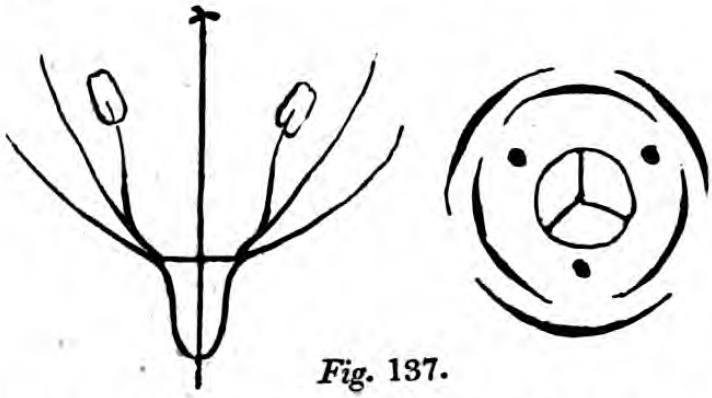


*Fig.* 137.

with their anthers turned outwards. Carpels 3, united into an inferior 3-celled ovary.

67. *Amaryllidaceæ.* — Flowers hexapetaloid. Stamens 6, with their anthers turned inwards. Carpels 3, united into an inferior 3-celled ovary.

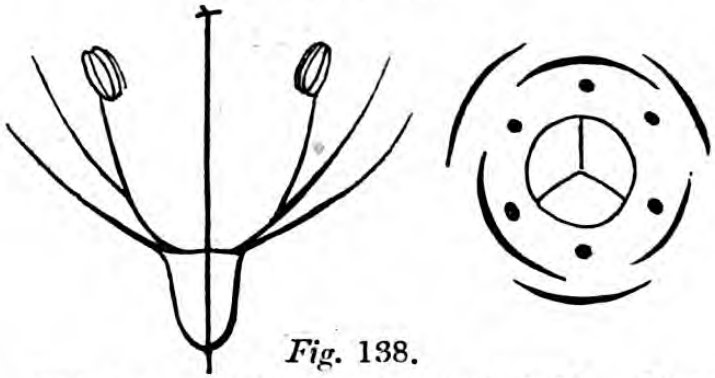


*Fig.* 138.

68. *Liliaceæ.* — Flowers hexapetaloid. Stamens 6,

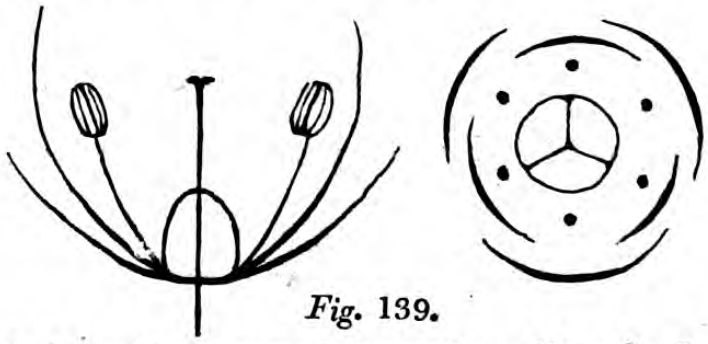


*Fig.* 139.

with their anthers turned inwards. Carpels 3, united into a superior 3-celled ovary.

69. *Melanthaceæ.* — Flowers hexapetaloid. Stamens

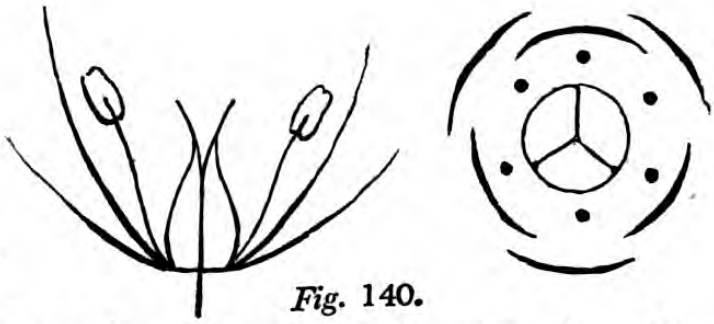


*Fig.* 140.

6, with their anthers turned outwards. Carpels 3, superior, many-seeded, with the styles sometimes united.

70. *Typhaceæ.* — Flowers unisexual, incomplete.*

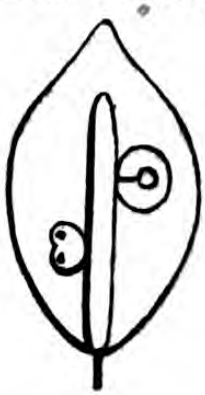
*Fig.* 141.

* That is, having a part of the organs missing. The term is generally used with reference to the calyx or corolla.

Anthers wedge-shaped, on long weak filaments. Carpel solitary, superior, 1-seeded.

71. *Araceæ.* — Flowers unisexual, naked *, enclosed

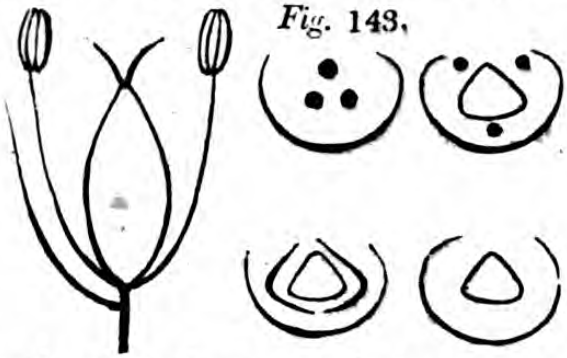
*Fig.* 142.



within a spatha.

72. *Cyperaceæ.*—Flowers glumaceous†, naked. Stem

*Fig.* 143.



solid. Sheath of the leaves perfect.

73. *Graminaceæ.* — Flowers glumaceous † and palea-

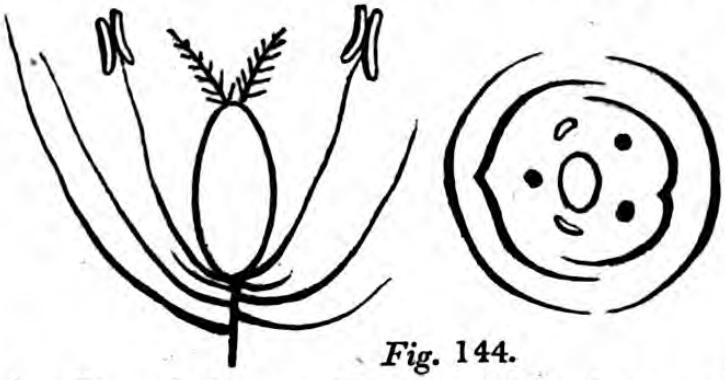


*Fig.* 144.

ceous. ‡ Stem hollow. Sheath of the leaves slit on one side.

* That is, having no calyx or corolla.
† That is, having the appearance of the *gluma*, or husk, of corn.
‡ That is, having the *palea*, or chaff, peculiar to corn. See the detailed account of these orders further on.

TABULAR VIEW OF THE PRECEDING NATURAL ORDERS.

A. *Ovary inferior.*
- *a.* Stamens 6 - - *Amaryllidaceæ.*
- *b.* Stamens 3 - - *Iridaceæ.*
- *c.* Stamen 1 - - *Orchidaceæ.*

B. *Ovary superior.*
- *a.* Flowers dimerous* - *Naiadaceæ.*
- *b.* Flowers trimerous, and completely tripetaloid, with 1-seeded carpels - *Alismaceæ.*
- *c.* Flowers trimerous and almost tripetaloid, with many-seeded carpels - *Butomaceæ.*
- *d.* Flowers trimerous and hexapetaloid.
  - *α.* Anthers turned inwards - *Liliaceæ.*
  - *β.* Anthers turned outwards - *Melanthaceæ.*
- *e.* Flowers incomplete.
  - *α.* Flowers within a spatha - *Araceæ.*
  - *β.* Flowers not within a spatha - *Typhaceæ.*
- *f.* Flowers glumaceous, with solid stems *Cyperaceæ.*
- *g.* Flowers glumaceous, with hollow stems *Graminaceæ.*

## LXII. ALISMACEÆ.

ESSENTIAL CHARACTER. — *Sepals* 3, herbaceous. *Petals* 3, regular, much larger than the sepals, and coloured. *Stamens* hypogynous, 6 or many more. *Ovaries* superior, 3-6, or many more, distinct, 1- or 2-seeded; *stigmas* simple. *Carpels* dry, indehiscent. — Water or marsh *plants*.

*** The numerous distinct carpels which are 1- or 2-seeded, give the plants something the appearance of Ranunculaceæ. The order differs from Butomaceæ in its carpels being 1-2-seeded, and from Juncaginaceæ in its petals being petaloid, that is large and coloured, not small and green.

* Δις, *two*, and μερος, *a part*. This is said when the parts of the flower are some power of 2; in like manner *trimerous* means that they are a power of 3; and so on.

### Alisma.

Flowers hermaphrodite. Sepals 3. Petals 3. Stamens 6. Carpels 6 or more, 1-seeded, indehiscent.

1. A. *Plantago* (*Water Plantain*). Leaves cordate, ovate, or lanceolate. Scape panicled, whorled. Carpels rounded at the point, furrowed at the back. ——— *Ditches.*

### Sagittaria.

Flowers monœcious. Calyx 3-parted. Petals 3. — *Males.* Stamens numerous. — *Females.* Carpels numerous, seated on a globose receptacle.

1. S. *sagittæfolia.* (*Arrow Head*). Leaves deeply arrow-headed. Scape simple. ——— *Ditches.* Flowers white.

## LXIII. BUTOMACEÆ.

Essential Character. — *Sepals* 3, usually herbaceous. *Petals* 3, coloured, petaloid. *Stamens* definite or indefinite, hypogynous. *Ovaries* superior, 3, 6, or more, either distinct or united into a single mass; *stigmas* the same number as the ovaries, simple. *Follicles* many-seeded, either distinct and rostrate, or united in a single mass. *Seeds* minute, very numerous, attached to the whole of the inner surface of the fruit. —*Aquatic* plants. *Leaves* very cellular, often yielding a milky juice, with parallel veins. *Flowers* in umbels, conspicuous, purple or yellow.

*** These are distinguished from the last by their carpels, each containing numerous small seeds.

### Butomus.

Sepals and petals equally coloured. Stamens 9, of which 3 are internal and petaloid. Ovaries 6, with long styles. Fruit capsular, dehiscing at the inner edge. Seeds linear-oblong, straight, with longitudinal streaks.

1. B. *umbellatus* (*Flowering Rush*). A plant 2-3 feet high, with narrow sword-shaped leaves, and umbels of dull purple flowers. ——— *Ditches and river sides.*

## LXIV. FLUVIALES, OR NAIADACEÆ.

ESSENTIAL CHARACTER. — *Flowers* hermaphrodite or unisexual. *Perianth* of 2 or 4 pieces, often deciduous, rarely wanting. *Stamens* definite, hypogynous. *Ovaries* 1 or more, superior; *stigma* simple; *ovule* solitary, pendulous. *Fruit* dry, not opening, 1-celled, 1-seeded. *Seed* pendulous. — *Water plants. Leaves* very cellular, with parallel veins. *Flowers* inconspicuous, usually arranged in terminal *spikes.*

### POTAMOGETON.

Sepals 2. Petals 2. Stamens 4, opposite the sepals and petals; anthers nearly sessile. Ovaries 4, alternate with the stamens; ovules solitary, suspended. Nuts 4, compressed. Seed suspended, arcuate, more or less spiral. — Floating plants, with pellucid leaves.

1. P. *natans.* Lower petioles leafless, elongated. Nuts large, keeled at the back. ——— *Rivers and ditches.*

2. P. *gramineus.* Leaves 3-ribbed, blunt, with a few obsolete veins. Spikes ovate, on short stalks. ——— *Rivers and ditches.*

### ZANNICHELLIA.

Flowers solitary, monœcious. — *Males.* Stamen single, naked, placed at the base of the female flower on the outside. — *Female.* Perianthium campanulate. Ovaries 2-6. Fruit dry, 1-seeded, sessile, compressed, gibbous, crenated outwardly.

1. Z. *palustris.* Anther of 4 cells. Stigmas entire. ——— *Rivers and ditches.*

## LXV. ORCHIDACEÆ.

ESSENTIAL CHARACTER. — *Perianth* superior, ringent. *Sepals* 3, coloured. *Petals* 3, coloured, of which 2 are uppermost, and 1, called the *lip,* undermost; this latter is frequently lobed, of a different form from the others, and very often spurred at the base. *Stamens* 1 or 2, united with the style and stigma into one solid column. *Ovary* 1-celled, with three parietal placentæ;

*style* forming part of the column of the stamens; *stigma* a viscid space in front of the column. *Capsule* inferior, bursting with 3 valves and 3 ribs. *Seeds* parietal, very numerous. — *Herbaceous* plants. *Roots* fleshy, divided or undivided, or fasciculate. *Leaves* simple, quite entire, often articulated with the stem. *Pubescence* rare; when present, sometimes glandular. *Flowers* in terminal or radical spikes, or racemes.

*** The gynandrous flowers are a certain mark of this order.

### Orchis.

Sepals and petals ringent, coloured; lip lobed, spurred at the base. Pollen masses with 2 glands, enclosed in a common pouch.

1. O. *mascula.* Roots oval, undivided. Lip 4-cleft, crenate; spur obtuse. Sepals 3-ribbed; two lateral ones reflexed upwards. ——— *Meadows and pastures.*

2. O. *Morio* (*Fool's Orchis*). Roots undivided, oval. Lip 4-cleft, somewhat crenate; spur obtuse, ascending. Sepals many-ribbed, converging. ——— *Meadows and pastures.*

3. O. *maculata.* Roots palmate, spreading. Lip flat, crenate, 3-lobed; spur cylindrical, rather shorter than the ovary. Bracteas shorter than the flowers. ——— *Meadows and pastures.*

### Aceras.

Sepals and petals helmet-shaped, herbaceous; lip coloured, lobed, hanging down, not spurred. Pollen masses with 2 glands enclosed in a common pouch.

1. A. *anthropophora* (*Man Orchis*). Lip longer than the ovary, 3-parted, with the intermediate segment 2-parted; all the divisions linear. ——— *Chalky downs.* Flowers greenish.

### Platanthera.

Sepals spreading or converging, coloured or herbaceous. Petals of the same figure as the sepals, coloured or herbaceous; lip entire or 3-lobed, with a spur at the base. Column very much compressed. Lobes of the anther diverging, not distinct from the processes of the column. Pollen masses with 2 naked glands.

1. P. *chlorantha* (*Butterfly Orchis*). Lip linear, undivided, with a spur twice as long as the ovary, filiform and clavate. Cells of the anther distant at the base. ——— *Woods.*

OPHRYS.

Sepals spreading, coloured or herbaceous. Petals much smaller than the sepals, generally coloured; lip convex, not spurred, more or less lobed, usually hairy, and figured. Pollen masses with 2 glands, each enclosed in a separate pouch.

1. C. *muscifera* (*Fly Orchis*). Lip twice as long as the sepals, flat, with 4 expanded lobes, somewhat downy; the disk polished. Petals linear, smooth. ——— *Chalky downs.*

2. O. *araneifera* (*Spider Orchis*). Lip the length of the sepals, tumid, hairy, rounded, emarginate, with 4 shallow, reflexed, marginal lobes. Sepals herbaceous. Petals linear, smooth. ——— *Chalky downs.*

3. O. *apifera* (*Bee Orchis*). Lip roundish obovate, convex, tumid, velvety, variegated, obscurely 5-cleft, with the point reflexed. Petals short, hairy. ——— *Pastures.*

## LXVI. IRIDACEÆ.

ESSENTIAL CHARACTER. — *Calyx* and *corolla* superior, their divisions either partially cohering, or entirely separate, sometimes irregular, the 3 petals being sometimes very short. *Stamens* 3, arising from the base of the sepals; *anthers* bursting externally lengthwise. *Ovary* 3-celled, cells many-seeded; *style* 1; *stigmas* 3; often petaloid, sometimes 2-lipped. *Capsule* 3-celled, 3-valved, with a loculicidal dehiscence. *Seeds* attached to the inner angle of the cell. — *Herbaceous* plants. *Roots* tuberous or fibrous. *Leaves* equitant, distichous, in most genera. *Inflorescence* terminal, in spikes, corymbs, or panicles, or crowded. *Bracts* spathaceous, the partial ones often scarious: the *sepals* occasionally rather herbaceous.

*** These are the only triandrous Endogens with a superior perianth.

CROCUS.

Perianth with a slender tube twice as long as the limb, which is 6-parted, equal, inflated, erect. Stigmas 3, convolute, many-lobed.

1. C. *vernus* (*Spring Crocus*). Flowers purple. Stigma within the flower, in 3 short, wedge-shaped, jagged lobes. Tube hairy at the mouth. ——— *Pastures and gardens.* Flowers in the spring.

2. C. *sativus* (*Saffron Crocus*). Flowers purple. Stigma prominent laterally, in 3 deep, linear, notched segments. ——— *Gardens.* Flowers in the autumn.

### Gladiolus.

Perianth coloured, 6-parted, irregular, 2-lipped. Stigmas 3, dilated upwards. Stamens ascending. Seeds winged.

1. G. *communis* (*Corn Flag*). Stem 5-8-flowered. Flowers secund, with the tube half as long again as the ovary. Stigmas dilated upwards. ——— *Gardens.* Flowers rosy purple, marked with letter-like spots in the orifice.

### Iris.

Perianth 6-parted; the sepals larger and spreading, the petals smaller and erect. Stamens distinct, opposite the sepals. Styles 3, very large, petaloid, opposite the sepals, and incumbent upon the stamens.

1. I. *germanica*. Flowers bearded. Leaves ensiform, falcate, shorter than the many-flowered stem. Spathes membranous, herbaceous at the base. Tube of the flower 2 or 3 times as long as the ovary. Petals oval, entire at the point. ——— *Gardens.* Flowers purple.

2. I. *Pseudacorus*. Flowers beardless; petals smaller than the styles. Leaves swrod-shaped. Seeds angular. ——— *Marshes.* Flowers yellow.

Fig. 145.


The accompanying figures (*fig.* 145.) represent garden species of this genus; viz. *a*, I. *persica*; *b*, I. *tuberosa*; *c*, I. *susiana*.

## LXVII. AMARYLLIDACEÆ.

ESSENTIAL CHARACTER.—*Calyx* and *corolla* superior, regular, coloured. *Stamens* 6, arising from the sepals and petals, sometimes cohering by their dilated bases into a kind of cup; sometimes an additional series of barren stamens is present, often forming a cup which surmounts the tube of the perianth; *anthers* bursting inwardly. *Ovary* 3-celled, the cells many-seeded, or sometimes 1- or 2-seeded; *style* 1; *stigma* 3-lobed. *Fruit* either a 3-celled 3-valved *capsule*, with loculicidal dehiscence, or a 1-3-seeded berry.— Generally *bulbous*, sometimes *fibrous*-rooted. *Leaves* ensiform. *Flowers* usually with spathaceous bracts.

*** The six stamens readily distinguish these from Iridaceæ, and the inferior ovary from Liliaceæ and Melanthaceæ.

### NARCISSUS.

Perianth funnel-shaped, with a spreading, 6-parted limb, surrounded at the orifice of the tube by a cup. Stamens 6, inserted in the tube, and concealed within the cup.

1. N. *Pseudo-Narcissus* (*Daffodil*). Flowers solitary. Cup bell-shaped, erect, crisped, with 6 marginal segments; its length equal to that of the ovate petals. ——— *Woods.*

### GALANTHUS.

Perianth in 6 pieces; the petals twice as short as the sepals, and emarginate. Stigma simple.

1. G. *nivalis* (*Snowdrop*). Leaves not plaited. Flowers white, nodding. ——— *Meadows and groves. Gardens.* The earliest of common spring flowers.

### LEUCOJUM.

Perianth with a short tube, and a campanulate equal limb, formed of 6 pieces, which are thickish at the apex. Stigma simple.

1. L. *vernum* (*Snowflake*). Spathe 1-flowered. Style clavate. ——— *Gardens.* Flowers white; the petals marked on the outside near the apex with a half-moon-shaped green spot, and inside with yellowish green lines.

## LXVIII. LILIACEÆ.

ESSENTIAL CHARACTER.—*Calyx* and *corolla*, coloured, regular, occasionally cohering in a tube. *Stamens* 6, inserted into the sepals and petals; *anthers* opening inwards. *Ovary* superior, 3-celled, many-seeded; *style* 1; *stigma* simple, or 3-lobed. *Fruit* succulent, or dry and capsular, 3-celled.— *Stem* none, except a bulb; or tuberous, creeping, erect, or arborescent. *Leaves* not articulated with the stem; either sessile or with a narrow leafy petiole.

### ASPARAGUS.

Perianth 6-parted, spreading, equal, deciduous. Stamens 6, inserted in the base of the sepals and petals. Filaments subulate, smooth. Anthers peltate, erect. Ovarium with 2-seeded cells. Style short, with 3 furrows. Stigma 3-lobed. Berry round, with from 1 to 3 cells, and few seeds.

1. A. *officinalis* (*Asparagus*). Stem herbaceous, round, erect, without prickles. Leaves scarious. Sterile branches bristle-shaped, flexible. Stipules mostly solitary. ——— *Sea coasts and gardens.*

### CONVALLARIA.

Sepals and petals united in a perianth, which is either globose or cylindrical, and 6-toothed. Stamens 6. Berry round, before maturity spotted, 3-celled, with 1-seeded cells.

1. C. *majalis* (*Lily of the Valley*). Flower-stalk radical, naked, semicylindrical. Raceme simple. Flowers drooping, cup-shaped, with rather distinct segments. ——— *Woods and meadows.*

### TULIPA.

Perianth campanulate, of 6 pieces, without honey-pores at the base. Stigmas 3, thick, sessile. Capsule oblong, 3-cornered. Seeds flat.

1. T. *sylvestris* (*Wild Tulip*). Flowers solitary, a little drooping. Leaves lanceolate. Stigma triangular, abrupt. Stamens hairy at the base. ——— *Pastures.* Flowers yellow.

### FRITILLARIA.

Perianth campanulate, of 6 pieces, with an oval honey-pore at their base. Stigmas 3. Seeds flat.

1. F. *meleagris* (*fig.* 146. *c*) (*Fritillary*). All the leaves alternate, linear-lanceolate, pointed. Stem single-flowered. Honey-pore linear. Points of the perianth inflexed. ——— *Gardens.*

2. F. *imperialis* (*fig.* 146. *a.*) (*Crown Imperial*). Flowers collected in a head surmounted by leafy long green bracts. ——— *Gardens.*

*Fig.* 146. *b* represents F. *persica*, a species cultivated in gardens, but not found in Europe.

*Fig.* 146.

### LILIUM.

Perianth 6-leaved, campanulate, more or less revolute at the edge; the segments marked at the base with a longitudinal nectariferous furrow. Style undivided; stigma 3-cornered. Seeds flat.

1. L. *candidum* (*White Lily*). Leaves lanceolate, alternate, wavy. Flowers white, stalked, terminal, smooth inside. ——— *Gardens.*

2. L. *bulbiferum* (*Orange Lily*). Leaves alternate. Flowers erect. Perianth campanulate, scabrous with warts inside. ——— *Gardens.*

### ERYTHRONIUM.

Perianth 6-leaved, campanulate at the base, then spreading, afterwards reflexed; two of the petals callous at the base inside. Style trifid. Seeds rounded.

1. E. *Dens Canis* (*Dog's-tooth Violet*). Leaves 2, oblong-elliptical, blotched with purple. Segments of the perianth acute. ——— *Gardens.*

### ALLIUM.

Perianth 6-parted, spreading. Stigma simple. Capsule 3-angular, the cells deeply parted in 2, separating from a permanent filiform axis.— Flowers in terminal umbels, with 2 herbaceous bracts.

1. A. *sativum* (*Garlic*). Stem round, leafy as high as the middle. Leaves broad, linear, flat, somewhat channelled. Spathe with a very long beak. Umbels bulbiferous. Alternate stamens with 2 teeth at the base. Bulb compound. ——— *Gardens.*

2. A. *Cepa* (*Onion*). Stem leafy at the base, inflated below the middle. Leaves fistular, ventricose. Umbel not bulbous, globose. Stamens longer than the perianth, alternately 2-toothed at the base. ——— *Gardens.*

3. A. *Scorodoprasum* (*Chives*). Stalk naked, round, the height of the foliage. Leaves cylindrical, somewhat tapering at the point. Stamens simple. ——— *Gardens.*

### Hyacinthus.

Perianth 6-cleft, tubular; segments spreading at the apex. Stamens inserted about the middle of the perianth. Capsule obtusely 3-cornered; cells many-seeded.

1. H. *nutans* (*Harebell*). Leaves linear. Bracts in pairs. Raceme nodding. ——— *Thickets.*

### Muscari.

Perianth ovate, inflated, 6-toothed. Capsule 3-cornered, with prominent angles. Cells 2-seeded.

1. M. *racemosum* (*Starch Hyacinth*). Flowers ovate, with 6 furrows; the upper ones sessile and abortive. Leaves linear, channelled, flaccid. ——— *Gardens.*

2. M. *comosum.* Flowers angular, cylindrical, the lower remote, and spreading horizontally; the upper barren, imperfect, and erect. Leaves linear, channelled. ——— *Gardens.*

### Ruscus.

Flowers dicœcious. Perianth 6-parted.—*Males.* Filaments united into a tube, with 3 anthers.—*Females.* Stamens sterile. Style 1. Stigma capitate. Berry 3-celled, with 2-seeded cells.

1. R. *aculeatus* (*fig.* 147.) (*Butcher's Brŏom*). Leaves ovate, mucronate, acuminate, having the flower on the upper side. Fascicles somewhat 2-flowered, with a minute bract at the base. ——— *Woods.*

+ *Fig.* 147. +

## LXIX. MELANTHACEÆ.

Essential Character. — *Perianth* inferior, petaloid, in 6 pieces, or, in consequence of the cohesion of the claws, tubular. *Stamens* 6; *anthers* turned outwards. *Ovary* 3-celled, many-seeded; *style* trifid, or 3-parted; *stigmas* undivided. — *Capsule* generally divisible into 3 pieces; sometimes with a loculicidal dehiscence. — *Roots* fibrous, sometimes fascicled. *Rhizoma* sometimes fleshy. *Leaves* sheathing at the base, with parallel veins. *Flowers* either arising from under the surface of the ground, or upon a leafy stem.

*** No Endogenous plants except these have a 3-parted superior pistil, and 6 stamens, with the anthers turned outwards.

### Colchicum.

Perianth tubular, long, with a campanulate 6-parted limb. Stamens inserted in the orifice of the tube. Anthers oblong, versatile. Ovary 1. Styles 3, very long. Follicles 3, inflated, erect, united at the base, many-seeded.

1. C. *autumnale* (*Meadow Saffron*). Leaves flat, lanceolate, erect. Segments of the corolla oblong. Flowers purple or white, appearing in the autumn; leaves in the spring. ——— *Pastures.*

### Veratrum.

Perianth 6-leaved. Anthers bursting transversely into 2 valves. Capsules 3, united at the base, many-seeded. Seeds plano-compressed or winged at the apex.

1. V. *album* (*White Hellebore*). Leaves elliptical, ribbed, downy beneath. Racemes panicled, downy. Bracts longer than the pedicels. ——— *Gardens.*

## LXX. TYPHACEÆ.

Essential Character. — *Flowers* unisexual, arranged upon a naked spadix. *Sepals* 3, or more, sometimes a mere bundle of hairs. *Petals* wanting. *Males: Stamens* 3 or 6, *anthers* wedge-shaped, attached by their base to long filaments, which are sometimes mona-

delphous. *Females:* *Ovary* single, superior, 1-celled; *ovule* solitary, pendulous; *style* short; *stigmas* 1 or 2, simple, linear. *Fruit* dry, not opening, 1-celled, 1-seeded. — *Herbaceous* plants, growing in marshes or ditches. *Stems* without nodi. *Leaves* rigid, ensiform, with parallel veins. *Spadix* without a spathe.

*** The very imperfect flowers of this order, the long weak filaments bearing wedge-shaped anthers, and the 1-celled 1-seeded fruit, are its principal marks.

### Typha.

Spikes cylindrical. — *Males.* Sepals 3, imperfect. Stamens 3, united at the base into 1. — *Females.* Sepals several, filiform, surrounding the stalk of the fruit.

1. T. *latifolia* (*Bulrush*). Leaves somewhat convex beneath. Catkin continuous. Receptacle hairy. ——— *Marshes, ponds, &c.* Heads of flowers long, black, cylindrical, resembling a gun sponge in miniature.

### Sparganium.

Spikes round. Sepals 3. Stamens 6; anthers wedge-shaped. Fruit sessile, turbinate, without bristles at the base.

1. S. *ramosum.* Leaves triangular at the base, with concave sides. Common flower-stalks branched. Stigmas linear. ——— *Marshes and ditches.*

## LXXI. ARACEÆ.

Essential Character. — *Flowers* unisexual, arranged upon a spadix, within a spathe. *Perianth* wanting. *Males:* *Stamens* definite or indefinite, very short. *Females:* *Ovary* superior, 1-celled, very seldom 3-celled, and many-seeded; *ovules* erect, pendulous, or parietal; *stigma* sessile. *Fruit* succulent. *Seeds* pulpy. — *Herbaceous* plants, frequently with a fleshy *cormus*, or *shrubs;* stemless or arborescent, or climbing by means of aerial roots. *Leaves* sheathing at the base, convolute in the bud, either with parallel or branching veins. *Spadix* generally enclosed in a *spathe.*

*** The naked flowers enclosed in a large hooded spathe, and arranged on a spadix, render it impossible to mistake this order.

ARUM.

Spadix naked at the apex, enclosed in a spathe. Flowers naked, the males crowded about the middle of the spadix; the females seated at the base. Berry 1-celled, many-seeded.

1. A. *maculatum.* Stem none. Leaves halberd-shaped, entire. Common stalk of the flowers club-shaped, obtuse. ——— *Hedgerows.*

2. A. *Dracunculus.* Radical leaves pedate, with entire lobes. Spadix lanceolate, longer than the ovate flat spathe. ——— *Gardens.* Stalks of the leaves banded and spotted with dull purple.

## LXXII. CYPERACEÆ.

ESSENTIAL CHARACTER.— *Flowers* hermaphrodite or unisexual, consisting of imbricated bracts. *Perianth* none, unless the glumes, when present, be so considered, or the hypogynous setæ. *Stamens* hypogynous, definite; *anthers* fixed by their base, entire, 2-celled. *Ovary* 1-seeded, often surrounded by bristles called hypogynous setæ; *style* single, trifid, or bifid; *stigmas* undivided, occasionally bifid. *Nut* crustaceous or bony. *Albumen* of the same figure as the seed; *embryo* lenticular, undivided, enclosed within the base of the albumen.—*Roots* fibrous. *Stems* very often without joints, 3-cornered or taper. *Leaves* with their sheaths entire. The lowermost bracts often sterile.

*** Very like Graminaceæ, but readily known by the stem being solid, the sheaths of the leaves undivided, and the want of paleæ.

SCHŒNUS.

Spikes terminal. Involucre 2- or many-leaved. Rachis nearly straight. Lower bracteæ smaller than the rest, and empty. Hypogynous setæ 0. Fruit 3-cornered, with a very short point. Style filiform, deciduous.

1. S. *mucronatus*. Stem taper, naked. Head terminal, hemispherical. Involucre 3-6-leaved, spreading. Leaves linear, somewhat channelled. ——— *Sea banks.*

### Scirpus.

Spikes lateral or terminal. Rachis nearly straight. Bracteæ gradually diminishing in size. Hypogynous setæ shorter than the bracteæ, or nearly of the same length. Style filiform, 2- or 3-parted, deciduous. Fruit 2-edged or 3-cornered, mucronate, usually plano-convex.

1. S. *lacustris*. Stem round, naked. Panicle cymose, twice compound, terminal. Spikes ovate. Involucral leaves generally much shorter than the panicle. ——— *Ponds.*

### Eriophorum.

Spike terminal. Rachis nearly straight. Bracteæ gradually diminishing in size. Hypogynous setæ much longer than the bracteæ, persistent. Style 2- or 3-parted, filiform, deciduous. Fruit 3-cornered, pointed.

1. E. *polystachyon* (*Cotton Grass*). Stem round. Leaves flat, lanceolate, with a triangular point. Stalks of the spikes smooth. Setæ thrice the length of the spike. ——— *Wet heaths.*

### Carex.

Spikes bisexual or unisexual (diœcious or androgynous). Bracteæ single. Glumes of the male florets wanting, of the female 2, united at the margins, ribbed, becoming hard, and enclosing a nut. Style 2- or 3-parted. Hypogynous setæ wanting.

1. C. *acuta*. Stigmas 2. Spikes cylindrical, slender; drooping in flower; afterwards erect. Fruit elliptical, with a blunt undivided beak. ——— *Ditches.*

2. C. *præcox*. Sheaths about equal to the very short flower-stalks. Spikes all elliptical, rather crowded. Bracteæ of the fertile ones pointed. Fruit pear-shaped, downy, with an abrupt, entire point. ——— *Heaths.*

3. C. *strigosa*. Sheaths nearly equal to the flower-stalks. Spikes slender, loose, slightly drooping. Fruit lanceolate, triangular, ribbed. ——— *Woods and ditches.*

4. C. *distans*. Sheaths tubular, elongated, nearly equal to the flower-stalks. Fertile spikes elliptic-oblong, widely distant. Bracteæ pointed. Stem smooth. ——— *Meadows and ditches.*

5. C. *hirta*. Herbage hairy. Fertile spikes ovate-cylindrical, remote. Bracteæ awned. Sheaths nearly as long as the flower-stalks. Fruit hairy, tumid, with a deeply cloven beak. Stem rough-edged. ——— *Ditches, &c.*

6. C. *riparia*. Stigmas 3. Spikes erect, with taper-pointed bracteæ. Fruit ovate, tumid, with a deeply cloven beak. ——— *Ponds and marshy places.*

## LXXIII. GRAMINACEÆ.

Essential Character. — *Flowers* usually hermaphrodite, sometimes monœcious or polygamous; consisting of imbricated bracts, of which the most exterior are called *glumes*, the interior immediately enclosing the stamens *paleæ*, and the innermost at the base of the ovarium *scales*. *Glumes* usually 2, alternate; sometimes single, most commonly unequal. *Paleæ* 2, alternate; the lower or exterior simple, the upper or interior composed of 2 united by their contiguous margins, and usually with 2 keels, together forming a kind of dislocated calyx. *Scales* 2 or 3, sometimes wanting. *Stamens* hypogynous; *anthers* versatile. *Ovary* simple; *styles* 2, very rarely 1 or 3; *stigmas* feathery or hairy. *Pericarp* usually undistinguishable from the seed, membranous. *Albumen* farinaceous; *embryo* lying on one side of the albumen at the base, lenticular. — *Rhizoma* fibrous or bulbous. *Culms* cylindrical, usually fistular, closed at the joints, covered with a coat of silex. *Leaves* alternate, with a split sheath. *Flowers* in little spikes called *locustæ*, arranged in a spiked, racemed, or panicled manner.

### Anthoxanthum.

Glumes 2, the lower smaller, the upper enfolding the paleæ, and longer than them. Florets 3; the two lateral neuter, the middle hermaphrodite. Paleæ of the neuter florets single; one with a dorsal awn, the other with an awn from the base. Paleæ of the hermaphrodite florets 2, nearly equal, awnless. Stamens 2.

1. A. *odoratum* (*Sweet Vernal Grass*). Panicle spiked, ovate-oblong. Florets longer than their awns, on short partial stalks. ——— *Dry pastures.*

### Alopecurus.

Panicle contracted. Glumes 2, equal, keeled, often connate at the base, about as long as the paleæ. Paleæ single, with an awn arising from its base, ribbed. Style single or double, hairy.

1. A. *pratensis* (*Timothy Grass*). Stem erect, smooth. Spike ovate, somewhat panicled. Glumes woolly, obliquely abrupt, nearly as long as the awn of the paleæ. ——— *Meadows and pastures.*

### Phleum.

Panicle contracted. Glumes 2, keeled, equal, longer than the paleæ, with an awn proceeding from the midrib. Paleæ 2, equal, awnless, membranous, usually convex, and ribless. Styles half pencil-shaped.

1. P. *pratense* (*Cat's-tail Grass*). Cluster spiked, cylindrical. Glumes abrupt, fringed at the keel, longer than the awns. ——— *Meadows and pastures.*

### Agrostis.

Panicle loose. Glumes 2, nearly equal, the lower larger, longer than the paleæ. Paleæ 2, unequal, the lower larger, sometimes with a dorsal awn. Styles feathery.

1. A. *stolonifera* (*Fiorin Grass*). Panicle condensed at the base of the main divisions; stalks rough. Glumes lanceolate, bristly at the keel. Stem spreading, creeping. Ligula oblong, ribbed. ——— *Wet places.*

2. A. *vulgaris.* Panicle spreading; with divaricated, capillary branches. Glumes nearly equal. Stem erect. Ligula abrupt, very short. ——— *Dry banks, &c.*

### Phragmites.

Glumes 2. Florets 3-7; the lower ♂ and naked, the remainder ♀ and surrounded with silky hairs.

1. P. *communis* (*Reed*). Florets about 5, awnless, longer than the glumes. Panicle loose. ———*Marshes, rivers, ponds, &c.*

### Holcus.

Panicle loose. Spikelets 2-flowered; lower floret awnless and hermaphrodite; upper awned, and male. Glumes 2, nearly equal, rather longer than the florets. Paleæ 2; the lower awnless, or awned under the apex.

1. H. *mollis* (*Soft Grass*). Glumes partly naked. Lower floret perfect, awnless; upper with a sharply bent prominent awn. Leaves slightly downy. Root creeping. ——— *Bad pastures and fields.*

### Avena.

Panicle loose. Spikelets many-flowered, upper florets sterile and imperfect. Glumes 2, nearly equal, as long as the paleæ. Paleæ 2, the lower bifid, with a twisted dorsal awn.

1. A. *sativa* (*Common Oat*). Panicle spreading, equal. Glumes generally 2-flowered, and longer than the florets; the upper 9-ribbed. Florets smooth, bifid, and toothed at the point. ——— *Fields.*

2. A. *orientalis* (*Polish Oat*). Panicle contracted, secund. Glumes generally 2-flowered, longer than the florets; the upper 9-ribbed. Florets smooth, bifid and toothed at the point. ——— *Fields.*

3. A. *sterilis* (*Animal Oat*). Panicle secund. Glumes generally 4-flowered, the upper 9-ribbed. Two lower florets hairy at the lower part, with a long stiff twisted awn. ——— *Gardens.*

### Briza.

Panicle loose. Spikelets many-flowered, cordate. Glumes 2, equal, convex, about as long as the lower florets. Paleæ 2, convex, awnless; their margins not involute. Scales acuminate, gibbous at the base. Styles feathery almost to the base.

1. B. *media* (*Maiden Hair*). Spikelets ovate, about 7-flowered. Glumes shorter than the florets. Ligula very short and blunt. ——— *Pastures.*

### Poa.

Panicle loose, seldom contracted. Spikelets 3- or many-flowered, or even 2-flowered, with the pedicels of a greater number of florets; florets articulated with their rachis. Paleæ 2, nearly equal, awnless. Scales oval, acute, gibbous at the base.

1. P. *annua*. Panicle widely spreading. Spikelets ovate, 5-flowered. Florets a little remote, 5-ribbed, without a web. Stems oblique, compressed. ——— *Every where.*

2. P. *pratensis*. Panicle spreading. Spikelets 4-flowered. Florets lanceolate, 5-ribbed, connected by a web. Ligula

short and obtuse. Stem and leaves smooth. Root creeping. ——— *Pastures.*

### Dactylis.

Panicle loose or contracted; branches solitary; terminal ramifications always very short. Spikelets clustered, many-flowered, horizontal. Glumes 2, unequal-sided. Paleæ 2, the lower awned under the apex, the upper of nearly the same size.

1. D. *glomerata* (*Cock's-foot Grass*). Panicle distantly branched. Flowers in dense globular tufts, unilateral. Paleæ somewhat awned, 5-ribbed, taper-pointed. ———*Dry fields.*

### Cynosurus.

Panicle contracted. Spikelets 2- or many-flowered, resting upon pinnate bracteæ. Glumes 2, about the same length as the florets. Paleæ 2; the lower awned from the apex or mucronate. Scales lanceolate, acute. Styles feathery or hairy.

1. C. *cristatus* (*Crested Dog's-tail Grass*). Spike simple, linear. Neuter spikelets without awns. ——— *Pastures.*

### Festuca.

Panicle loose. Spikelets many-flowered, the florets deciduous. Glumes 2, unequal, or nearly equal, acute. Paleæ 2; the lower mucronate or awned at the point. Scales 2, usually toothed.

1. F. *pratensis* (*Meadow Fescue*). Panicle nearly upright, branched, spreading, turned to one side. Spikelets linear, compressed. Florets numerous, cylindrical, obscurely ribbed. Root fibrous. ——— *Pastures.*

### Bromus.

Panicle loose. Spikelets more than 4-flowered. Glumes 2, unequal, shorter than the lower florets. Paleæ 2; the lower awned under the apex, very seldom awnless. Scales lanceolate, entire.

1. B. *mollis.* Panicle erect, rather close, compound. Spikelets ovate, downy. Florets imbricated, depressed, ribbed. Awns as long as the glumes. Leaves and sheaths very soft and downy. ——— *Dry fields.*

2. B. *sterilis.* Panicle drooping, mostly simple. Spikelets

linear-lanceolate. Florets about 7, lanceolate, compressed, 7-ribbed, furrowed. Awns longer than the glumes. Leaves downy. ——— *Fields, and on walls.*

### Triticum.

Spikelets solitary, sessile in notches of the rachis, with which they are parallel. Glumes 2-, 3-, or many-flowered, carinate, acute or mucronate. Paleæ 2; the lower often awned.

1. T. *vulgare* (*Wheat*). Ear 4-cornered, imbricated. Rachis tough. Spikelets generally 4-flowered. Glumes ventricose, ovate, truncated, mucronate, compressed below the point. Grain loose. ——— *Fields.*

2. T. *repens* (*Couch Grass*). Glumes pointed or awned, lanceolate, many-ribbed. Florets about 5, sharp-pointed or awned. Leaves flat. Root creeping. ——— *Fields.*

### Secale.

Glumes subulate. Spikelets 2-flowered, with the rudiment of a third flower on a long stalk. Otherwise like Triticum.

1. S. *cereale* (*Rye*). Glumes shorter than the spikelet. Rachis tough. ——— *Fields.*

### Hordeum.

Spikelets in pairs or threes, 1-flowered. Glumes 2. Paleæ 2, the lower awned at the apex. Scales obtuse, fringed. Styles feathery. Ovarium villous at the end.

1. H. *vulgare* (*Common Barley*). Spikelets all hermaphrodite, when in front arranged in 6 rows, two of which project more than the others. ——— *Fields.*

2. H. *murinum*. Lateral flowers barren. Glumes of the intermediate ones lanceolate, fringed. ——— *Walls and waste places.*

### Lolium.

Spikelets many-flowered, at right angles with the rachis. A bractea at the base of the spikelet. Glumes 2, lateral, often deficient. Paleæ 2, nearly equal; the outer often awned under the apex. Scales oval, gibbous, nearly acute. Styles feathery.

1. L. *perenne* (*Ray Grass*). Paleæ very slightly awned. Spikelets longer than the glumes. Florets lanceolate. ——— *Fields.*

2. L. *temulentum* (*Darnel*). Awns longer than the paleæ. Spikelets shorter than the glumes. Florets elliptical. Stem rough in the upper part. ——— *Corn fields.*

---

**The following orders of this class are also included in the Flora of Europe.**

## PALMACEÆ.


*Fig.* 148.

ESSENTIAL CHARACTER. — *Flowers* hermaphrodite, or frequently polygamous. *Perianth* 6-parted, in two series, per-

sistent; the 3 outer segments often smaller, the inner sometimes deeply connate. *Stamens* inserted into the base of the perianth, usually definite in number. *Ovary* 1, 3-celled, or deeply 3-lobed; the lobes or cells 1-seeded, with an erect ovule. *Fruit* baccate or drupaceous, with fibrous flesh. *Albumen* cartilaginous; *embryo* lodged in a particular cavity of the albumen, usually at a distance from the hilum. — *Trunk* arborescent, simple, occasionally shrubby and branched, rough with the dilated half-sheathing bases of the leaves or their scars. *Leaves* clustered, terminal, very large, pinnate or flabelliform, plaited in vernation. *Spadix* terminal, often branched, enclosed in a 1- or many-valved spatha. *Flowers* small, with bractlets. *Fruit* occasionally very large.

*** It is only because the *Fan Palm* (*Chamærops humilis*) (*fig.* 148. *a*) is found in Italy, that this natural order is admitted into the European Flora. The *Date tree* (*Phœnix dactylifera*) (*fig.* 148. *b*) is only cultivated in the hottest Mediterranean regions. The peculiar foliage, and arborescent habit, sufficiently mark this order.

## SMILACEÆ.

Essential Character. — *Flowers* hermaphrodite or diœcious. *Calyx* and *corolla* confounded, inferior, 6-parted. *Stamens* 6, inserted into the perianth near the base; seldom hypogynous. *Ovary* 3-celled, the cells 1- or many-seeded; *style* usually trifid; *stigmas* 3. *Fruit* a roundish berry. — *Herbaceous* plants or *under-shrubs*, with a tendency to climb. *Stems* woody. *Leaves* reticulated.

*** Climbing plants, of which 2 or 3 species are found in the South of Europe. They have the leaves of Exogens.

## HYDROCHARACEÆ.

Essential Character. — *Flowers* hermaphrodite or unisexual. *Sepals* 3, herbaceous. *Petals* 3, petaloid. *Stamens* definite or indefinite. *Ovary* single, inferior, 1- or many-celled; *stigmas* 3-6; *ovules* indefinite, often parietal. *Fruit* dry or succulent, indehiscent, with 1 or more cells. *Seeds* without albumen; *embryo* undivided, antitropous. — *Floating* or water plants. *Leaves* with parallel veins, sometimes spiny. *Flowers* spathaceous.

*** The inferior ovary, and parietal ovules, approximate them to Orchidaceæ, but the stamens are distinct. Amaryllidaceæ differ in their flowers being hexapetaloid;

Alismaceæ in having apocarpous fruit. *Hydrocharis Morsus Ranæ* and *Stratiotes aloïdes* are water plants, common in some parts of England.

## JUNCACEÆ.

Essential Character. — *Calyx* and *corolla* forming an inferior, 6-parted, more or less glumaceous *perianth*. *Stamens* 6, inserted into the base of the segments. *Ovary* 1- or 3-celled, 1- or many-seeded, or 1-celled and 3-seeded. *Style* 1. *Stigmas* generally 3. *Fruit* capsular, with 3 valves, which have the dissepiment in their middle, sometimes destitute of valves, and 1-seeded by abortion. — *Herbaceous* plants, with fascicled or fibrous roots. *Leaves* fistular, or flat and channelled, with parallel veins. *Inflorescence* often more or less capitate. *Flowers* generally brown or green.

*** The true *Rushes*, consisting of various species of *Juncus*, belong to this unimportant order, which is hardly different from Liliaceæ; the principal distinction consists in the calyx and corolla being dry and brown in Juncaceæ.

## ACORACEÆ.

Essential Character. — *Flowers* hermaphrodite, surrounded with scales. *Spathe* leaf-like, not rolled up. *Stamens* complete, opposite the scales, with 2-celled anthers turned inwards. *Ovaries* distinct. *Fruit* baccate, finally juiceless. *Seeds* albuminous, with the embryo in the axis. — *Rhizoma* jointed. *Leaves* ensiform, embracing each other in the bud.

*** A single sword-leaved sedge-like plant, *Acorus Calamus*, inhabiting the sides of rivers and meadows, represents this order in Europe. It is very nearly the same as Araceæ, but the ovaries are distinct and surrounded by scales.

## JUNCAGINACEÆ.

Essential Character. — *Sepals* and *petals* both herbaceous, rarely absent. *Stamens* 6. *Ovaries* 3 or 6, superior, cohering firmly; *ovules* 1 or 2, approximated at their base, erect. *Fruit* dry, 1- or 2-seeded. *Seeds* erect; *albumen* wanting; *embryo* having the same direction as the seed, with a lateral cleft for the emission of the plumule. — *Herbaceous* bog plants. *Leaves* ensiform, with parallel veins. *Flowers* in spikes or racemes, inconspicuous.

*** *Triglochin*, the only common genus of this order, is a little grassy plant, having one species growing in salt, and the other in fresh, water marshes and meadows. The order differs from Alismaceæ in having the petals no larger than the sepals, and the ovaries consolidated; and from Naiadaceæ in having erect ovules.

## LEMNACEÆ, OR PISTIACEÆ.

ESSENTIAL CHARACTER. — *Flowers* 2, naked, enclosed in a spathe. *Male: Stamens* definite. *Female: Ovary* 1-celled, with 1 or more erect *ovules; style* short; *stigma* simple. *Fruit* membranous or capsular, not opening, 1- or more-seeded.

*** *Duckweed* (*Lemna*) is the lowest known form of Phænogamous vegetation. It consists of lenticular floating fronds composed of stem and leaf mixed together, and bearing the flowers in slits in the edge.

## RESTIACEÆ.

ESSENTIAL CHARACTER. — *Perianth* inferior, 2-6-parted, seldom wanting. *Stamens* definite, 2-6; *anthers* usually unilocular. *Ovary* 1- or more- celled, cells monospermous; *ovules* pendulous. *Fruit* capsular, or nucamentaceous. — *Herbaceous* plants. *Leaves* simple, narrow. *Culms* usually protected by sheaths, which are slit, and have equitant margins. *Flowers* in spikes or heads.

*** *Eriocaulon septangulare*, a rare plant, inhabiting the bottom of alpine lakes, represents this order, which hardly belongs to the European Flora. It is known from Graminaceæ and Cyperaceæ by its whorled perianth and capsular fruit, and from Juncaceæ by its unilocular anthers and pendulous seeds.

## CHAP. IX.

### OF CRYPTOGAMIC PLANTS, OR ACROGENS.

THESE are readily known by their not bearing flowers, on which account they are often called FLOWERLESS. They comprehend very different degrees of organisation, of which the highest, or most complete, have both stems and leaves, and even a peculiar sort of wood; the lowest, or most incomplete, nothing but slender simple-jointed threads; and the intermediate conditions a mixture of stem and leaf into thin expansions, called a *thallus*.

Acrogens are necessarily classified upon different principles from Exogens and Endogens. The last divisions of M. De Candolle are: —

Subclass 1. *Ætheogamous.* Plants furnished with air vessels and stomates or air pores.

Subclass 2. *Amphigamous.* Plants having neither air vessels nor stomates.

Under each of these the natural orders of Acrogens are arranged as follows: —

| Subcl. 1. *Ætheogamous.* | Subcl. 2. *Amphigamous.* |
|---|---|
| Filices. | Characeæ. |
| Equisetaceæ. | Musci, or Bryaceæ. |
| Marsileaceæ. | Andræaceæ. |
| Salviniaceæ. | Lichenaceæ. |
| Lycopodiaceæ. | Fungaceæ. |
| Marchantiaceæ. | Algaceæ. |
| Jungermanniaceæ. | |

But as these distinctions are only to be made out by those acquainted with vegetable anatomy, the young student requires some other method of arrangement; and that first proposed by M. De Candolle is preferable.

This botanist originally divided Acrogens into those which produce distinct leaves, and those which have no distinction between leaf and stem; the first he called *Foliaceæ*, or leafy, and the second *Aphyllæ*, or leafless.

The orders in the European Flora belonging to these two divisions are: —

I. *Foliaceæ*. —74. Filices; 75. Lycopodiaceæ; 76. Equisetaceæ; 77. Marsileaceæ; 78. Musci; 79. Andræaceæ; 80. Jungermanniaceæ.

II. *Aphyllæ*.—81. Marchantiaceæ; 82. Lichenaceæ; 83. Fungi; 84. Characeæ; 85. Algaceæ.

It is not necessary that the young student should occupy himself with these orders, further than to gain a general knowledge of the manner in which they differ from each other. For this reason, although their species are very numerous, but a few are particularly mentioned in this place; and those only for the purpose of making his knowledge of the orders more precise than it can be, if the general characters assigned to them are alone taken into account.

## LXXIV. FILICES.

ESSENTIAL CHARACTER. — A distinct *stem* and *leaves*; the latter usually divided into numerous pieces, marked with forking veins, and circinate when they first unfold. *Reproductive organs* either upon the backs of the leaves, or on the margin, or wrapped up in contracted and deformed leaves.

*Fig.* 149.

NEPHRODIUM.

Sori on the back of the leaves, covered with a kidney-shaped indusium.

1. N. *Filix mas.* Leaves bipinnate. Leaflets oblong, obtuse, serrated. Sori near the midrib. Leafstalk and rachis covered with ramenta. ——— *Woods and shady banks.*

PTERIS.

Sori on the margin of the leaf, on the under side, uninterrupted, linear, covered by the inflexed margin.

1. P. *aquilina* (*Common Brake*). Leaves tripartite; their principal divisions bipinnate; pinnules linear-lanceolate, the upper undivided, the lower pinnatifid, with oblong, obtuse segments. ——— *Woods and heaths.*

SCOLOPENDRIUM.

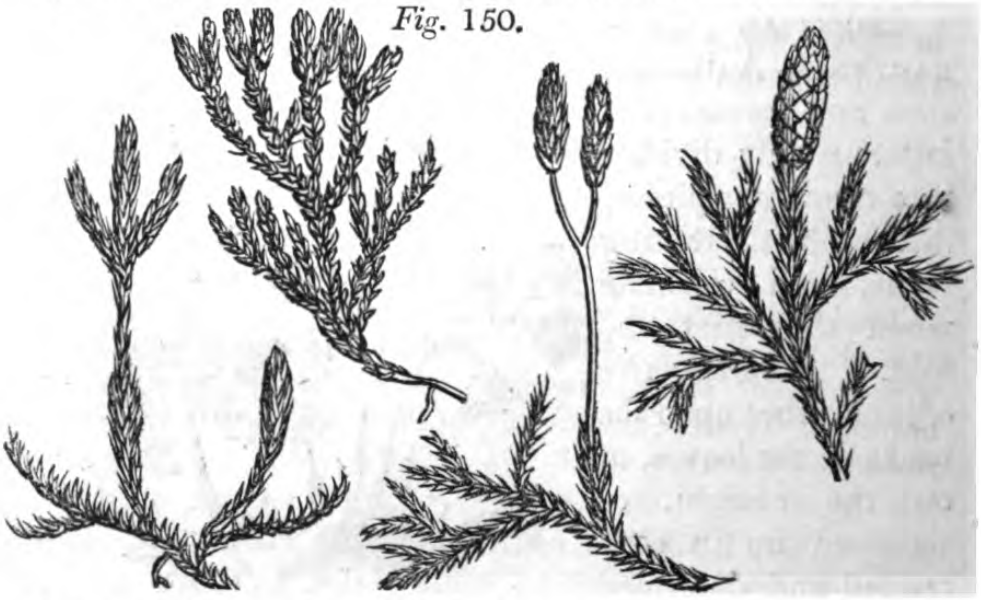
Sori linear, transverse, with a narrow indusium arising from each side and meeting in the middle.

S. *vulgare.* Leaves simple, oblong, cordate, with a ramentaceous stalk. ——— *Wells, damp rocks, &c.*

## LXXV. LYCOPODIACEÆ.

ESSENTIAL CHARACTER. — A distinct *stem*, dividing by forks, and covered with simple, scale-like, imbricated

*Fig.* 150.



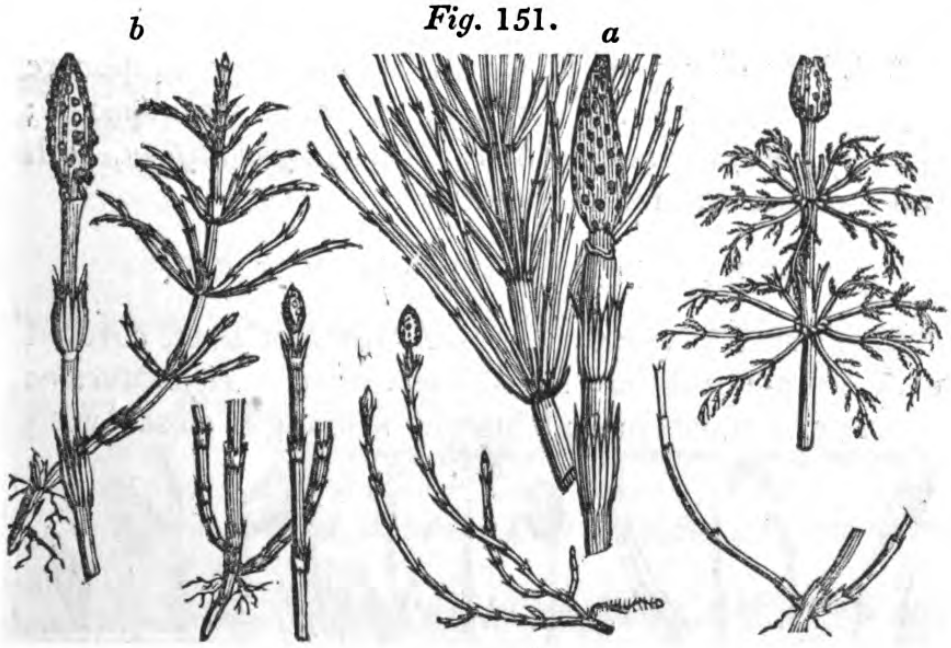
*leaves.* *Reproductive organs* powdery, enclosed in 2-valved axillary cases.

*** Trailing plants, inhabiting bogs and swampy heaths, or the springy sides of low mountains.

## LXXVI. EQUISETACEÆ.

Essential Character.—A distinct *stem*, furrowed, hollow, and branched in a verticillate manner. Leaves in the form of toothed sheaths. *Reproductive organs*

*Fig.* 151.




in cones, and consisting of a spore surrounded by clavate filaments twisted spirally.

### Equisetum.

1. E. *fluviatile* (*fig.* 151. *a*) (*Water Horsetail*). Fertile stems simple, with large loose sheaths; sterile much branched, with the teeth of the sheaths small and subulate. ——— *Ditches and ponds.*

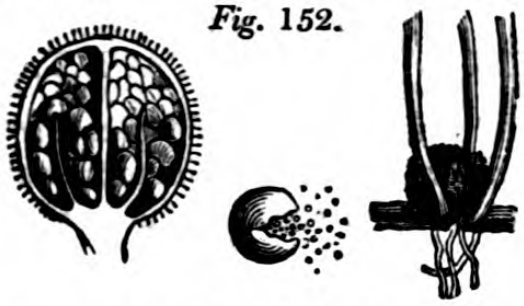
2. E. *arvense* (*fig.* 151. *b*). Fertile and sterile stems alike, with from 16 to 18 furrows, and with erect nearly simple branches. Teeth of the sheaths short and rigid. ——— *Watery places and ditches.*

## LXXVII. MARSILEACEÆ.

Essential Character.—Scarcely any distinct *stem*.

*Leaves* radical, simple, jointed or veiny. *Reproductive organs* enclosed within close involucra.

*Fig.* 152.

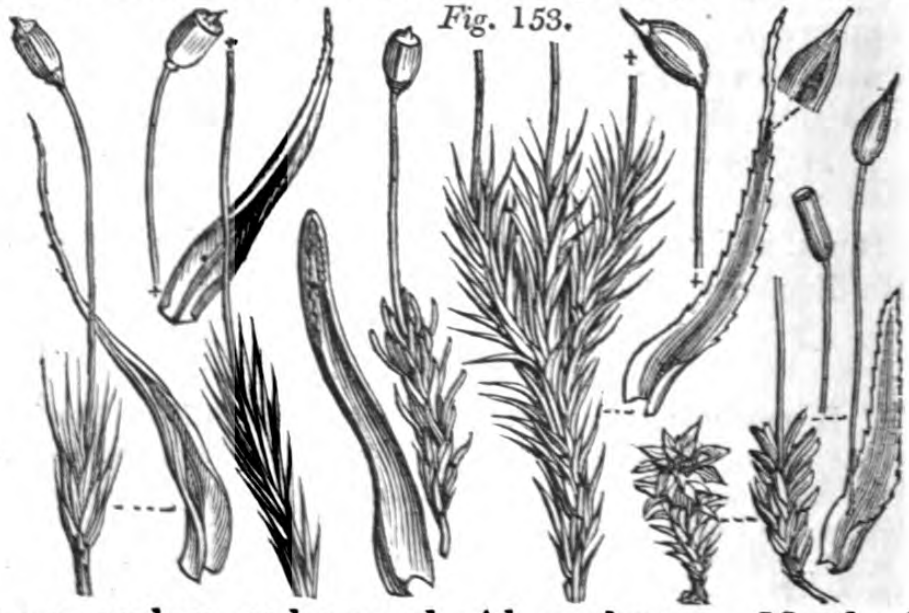


*** These plants are of too little importance to deserve notice here. England contains two species; *Isoetes lacustris* and *Pilularia globulifera*, both of uncommon occurrence.

## LXXVIII. MUSCI, OR BRYACEÆ.

ESSENTIAL CHARACTER. — A distinct *stem*, covered with simple imbricated veinless *leaves*. *Reproductive organs* contained in indehiscent sporangia closed with

*Fig.* 153.



an operculum, and covered with a calyptra. Mouth of the *sporangia* usually closed by teeth.

### SPHAGNUM.

Sporangium on a soft stalk. Calyptra torn irregularly. Mouth of the sporangium naked. Operculum deciduous.

1. S. *obtusifolium*. Branches tumid. Leaves ovate, obtuse. ——— *Bogs and swampy places.*

TORTULA.

Mouth of the sporangium simple, composed of 32 teeth, twisted spirally, and more or less united at their base.

1. T. *muralis*. Stem short, leaves spreading, narrow, oblong, recurved at the edge, the midrib extended into a hair-like point. Sporangium oblong-cylindrical. Operculum conical, acuminate. ——— *Walls.*

FUNARIA.

Mouth of the sporangium double; the outer of 16 compact teeth, the inner of as many ciliæ. Sporangium pyriform, its mouth oblique.

1. F. *hygrometrica*. Leaves concave, ovate, apiculated, entire, with the rib projecting beyond their point. Stalk of sporangium curved, flexuose. ——— *Walls, woods, and heaths.*

HYPNUM.

Mouth of the sporangium double, the outer consisting of 16 teeth, the inner of the same number united into a membrane, and often having accessory filiform teeth between them. Calyptra slit on one side.

1. H. *purum*. Leaves closely imbricated, oval, with a very short point, very concave, the midrib reaching half-way up. Sporangium ovate, drooping. Operculum conical. ——— *On the ground. Common.*

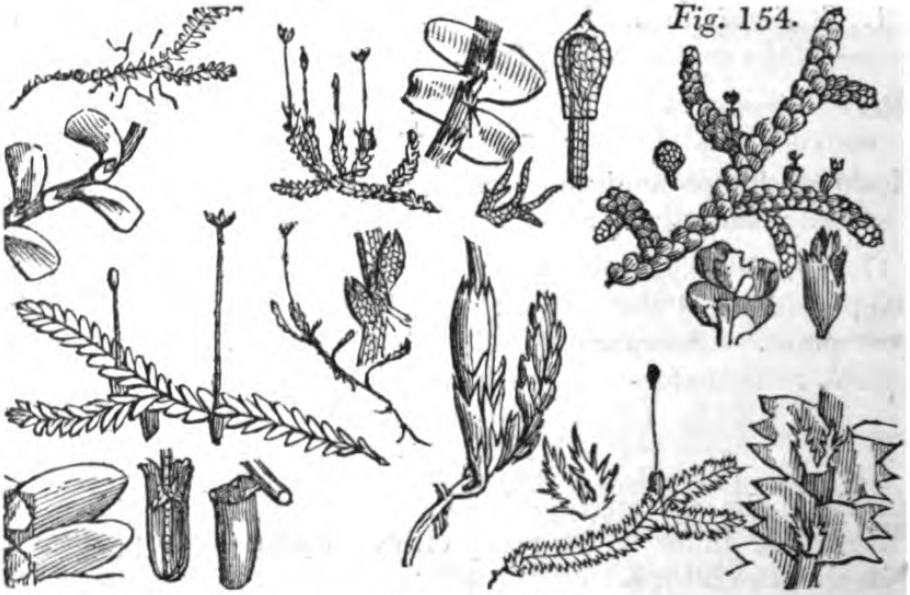
## LXXIX. ANDRÆACEÆ.

*** These are in all respects the same as the last order, except that the sporangium splits into two valves. They are of rare occurrence, and of no importance.

## LXXX. JUNGERMANNIACEÆ.

ESSENTIAL CHARACTER. — A distinct *stem*, covered with scale-like leaves. *Sporangium* without calyptra and operculum, and splitting into 4 valves, within which are numerous elaters or spiral threads, and spores.

Fig. 154.



*** These are moss-like plants, occurring in damp places, and on the bark of trees in shady woods. They are not sufficiently common to deserve particular mention.

## LXXXI. MARCHANTIACEÆ.

Essential Character. — *Stem* and *leaves* united into a broad, green, lobed thallus, spreading upon the ground. *Reproductive organs* usually on stalked peltate

Fig. 155.

receptacles, and of two or three different kinds, none of which are dehiscent sporangia.

MARCHANTIA.

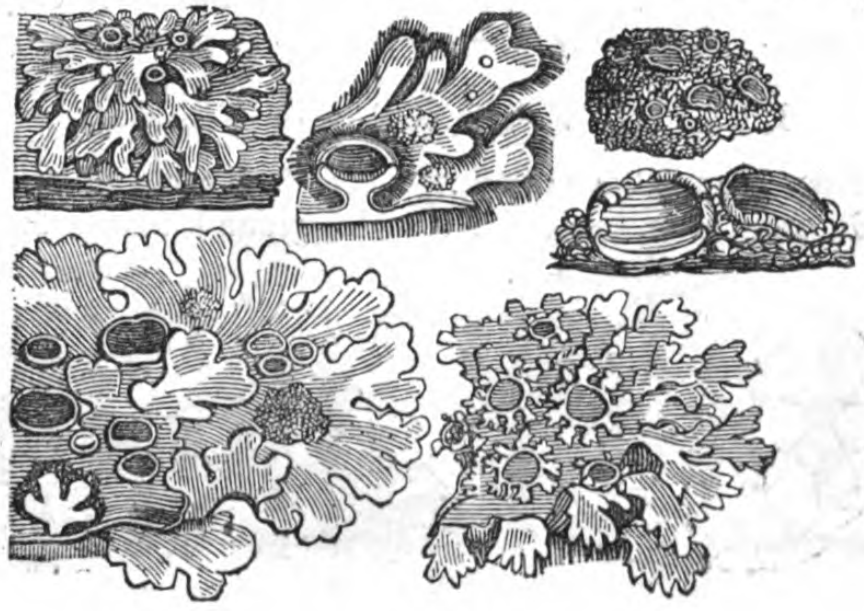
Receptacles stalked, peltate; having on the under side short-stalked pendulous sporangia, filled with spores and spiral elastic fibres (*elaters*). Buds lenticular, in cup-shaped disks. Staminidia embedded in a flat fleshy disk.

1. M. *polymorpha.* Receptacle divided at the margin into 10 narrow segments. Disks containing staminidia, stalked. ——— *Moist shady places.*

## LXXXII. LICHENACEÆ, OR LICHENES.

ESSENTIAL CHARACTER. — *Aerial* plants. *Leaves* and *stem* combined into a visible above-ground thallus, which either spreads horizontally in the form of a lobed irregular crust or plate, or rises erect with irregular unsymmetrical branches. *Reproductive organs* embedded in external disks or shields.

*Fig.* 156.



### Parmelia.

Thallus leafy, membranous, or coriaceous, spreading, fibrous beneath. Shields orbicular, beneath formed of the thallus, fixed only by a central point; disk concave, bordered by the inflexed thallus.

1. P. *parietina.* Thallus orbicular, bright yellow, the lobes radiating, rounded, crenate and crisped, granular in the centre. Shields deep orange, concave, with an entire border. ——— *Pales, trees, &c.*

### Lecanora.

Thallus crustaceous, flat, adnate, uniform. Shields orbicular, thick, sessile; the disk plano-convex, and bordered by the thallus.

1. L. *tartarea* (*fig.* 157.) (*Cudbear*). Crust thick, granulated, and tartareous, greyish white. Shields scattered; the disk convex, yellow brown, inclining to flesh colour; the border thick, inflexed, at length wavy. ——— *Rocks.*

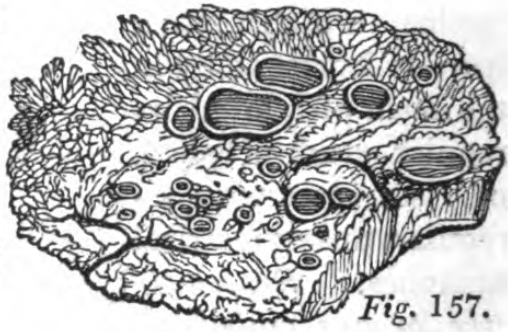


*Fig.* 157.

### Scyphophorus.

Thallus shrubby, round, branched, fistular, erect. Disks convex, capitate, without a border.

1. S. *pyxidatus.* Thallus leafy, mealy; the lobes crisp, ascending. Shields linear. ——— *Heaths.*

## LXXXIII. FUNGACEÆ, or FUNGI.

Essential Character. — *Aerial* plants. *Leaves* and *stem* none, except an under-ground filamentous

*Fig.* 158.

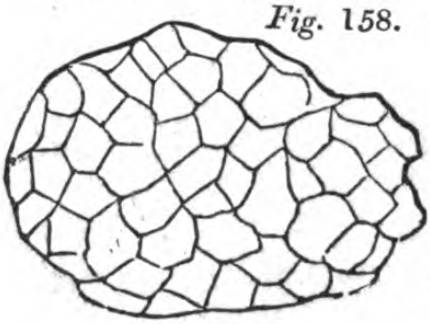


*Fig.* 159.

*Fig.* 160.

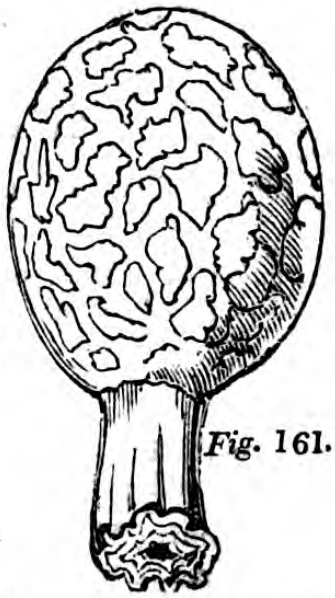


*Fig.* 161.

thallus, which is often apparently absent. *Reproductive organs* simple, either concealed in a large fleshy mass of cellular substance, or naked.

### Agaricus.

Fructification a cap, divided by lamellæ on the under side. Spores placed in fours on a common stalk, growing from the face of the lamellæ.

1. A. *campestris* (*fig.* 160.) (*Mushroom*). Cap fleshy, dry, somewhat scaly or silky. Lamellæ pink, free, at length brown. Stipe solid, furnished with a ring, white. ——— *Pastures.*

2. A. *comatus.* Cap somewhat fleshy, scaly, white. Lamellæ white, thin, brown purple. Stipe somewhat bulbous. Ring movable. ——— *Waste places.*

### Boletus.

Fructification a cap, pierced by cylindrical separable tubes. Spores arranged in fours, on a common stalk, inside the tubes.

1. B. *lucidus.* Cap pulvinate, somewhat downy, olive-coloured. Tubes nearly free, round, yellow, red at the orifice. Stipe thick, more or less marked with crimson. ——— *Woods.*

### Tuber.

Fructification a rough, roundish, fleshy mass, containing winged sporangia in the cavities.

1. T. *cibarium* (*fig.* 158.) (*Truffle*). Subterranean, warted, black. ——— *Beech woods.*

### Tubercularia.

Spores simple, collected into a roundish, erumpent, distinct disk.

1. T. *vulgaris.* Red, erumpent, globular, naked at the edge. ——— *Dead sticks.*

### Puccinia.

Sporangia with 1 or 2 partitions, stalked, collected into tubercles, bursting from under the skin of plants.

1. P. *Graminis* (*Mildew*). Spots pale, spreading, in linear confluent streaks. Sporangia becoming black. ——— *Stems of corn.*

## LXXXIV. CHARACEÆ.

**Essential Character.** — *Aquatic* plants with *leaves* and *stem* combined into articulated, hollow, verticillate branches, which consist either of simple tubes, or of a layer of tubes external to the first tube; in the latter case the branches are striated, in the former smooth. *Reproductive organs* consisting of globules of a reddish colour, and of spirally twisted nucules.

*Fig.* 162.

### Chara.

Branches compound, striated, brittle.

1. C. *vulgaris.* Smooth, opaque, brittle, not incrusted, obscurely striated. Branches slender, subulate, much longer than the organs of reproduction. ——— *Ditches and stagnant pools.*

NITELLA.

Branches simple, smooth, flexible. (*fig.* 162.)

1. N. *flexilis.* Long, smooth, flaccid, pellucid, very dichotomous. Branches simple or divided, obtuse. Reproductive organs almost naked. ——— *Ditches and lakes.*

## LXXXV. ALGÆ, OR ALGACEÆ.

ESSENTIAL CHARACTER. — *Submersed* plants, with the *stem* and *leaves* combined into lobed fronds, or reduced to capillary divisions. *Reproductive organs* either special and external to the frond, or a mere dissolution of the interior.

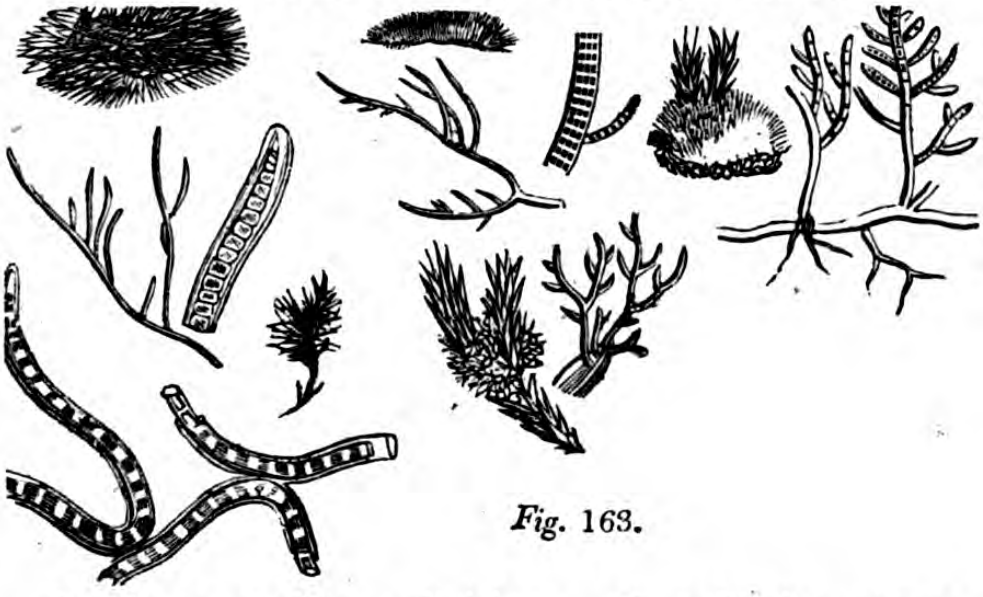


*Fig.* 163.

FUCUS.

Frond plane, compressed or linear, dichotomous, coriaceous. Receptacles terminal, tumid, containing sporangia embedded in mucilage, and discharging the spores through pores in the receptacles.

1. F. *vesiculosus.* Frond flat, linear, dichotomous, entire, with a central rib. Air-bladders spherical. Receptacles terminal, elliptical, solitary. ——— *Sea coast.*

ULVA.

Frond membranous, green, with the spores arranged in fours inside the cells.

1. U. *bullosa*. Frond obovate, bagged, gelatinous, at length irregularly expanded, floating, waved and blistered. ——— *Ditches.*

CONFERVA.

Frond composed of simple or branched threads, which are articulated, branched, and filled with locomotive spores.

There are numerous species, inhabiting fresh water, especially such as is stagnant or slowly flowing, in the form of green entangled threads.

The orders of Acrogens above mentioned may be distinguished thus: —

A. FOLIACEÆ.

*a*. Leaves compound, or at least veiny - *Filices.*
*b*. Leaves simple.
  *α*. Imbricated.
    1. Fructification in axillary 2-valved sporangia - - *Lycopodiaceæ.*
    2. Fructification in hollow, calyptrate, indehiscent sporangia - *Musci.*
    3. Fructification in hollow, calyptrate, 4-valved sporangia - *Andræaceæ.*
    4. Fructification in hollow, naked, 4-valved sporangia - *Jungermanniaceæ.*
  *β*. All radical - - *Marsileaceæ.*
  *γ*. Arranged in toothed sheaths *Equisetaceæ.*

B. APHYLLÆ.

*a*. Reproductive organs mixed with elaters. *Marchantiaceæ.*
*b*. Reproductive organs without elaters.
  *α*. Consisting of external shields placed upon a visible thallus - - *Lichenes.*
  *β*. Consisting of spiral nucules - *Characeæ.*
  *γ*. Consisting of fleshy heads without a visible thallus - - - *Fungi.*
  *δ*. Consisting of submersed filaments or membranes enclosing spores - *Algaceæ.*

# INDEX.

THE END.

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