

PART II.

THE ORGANS OF FRUCTIFICATION.

*The Fructificatio,** or *Fructification*, consists of the flower and the fruit; neither of which is permanent, but both disappear upon the ripening of the seeds. These are beautifully defined by Plinæus, to be temporary parts of vegetables, terminating the existence of the old, and forming the æra of the new. The flower is the first to decay, or fall off; after which, the fruit advances to perfection; but it is sufficiently established, on the authority of most learned men, that the *primordia*, or earliest rudiments of the fruit, pre-exist in the flower.

The parts of Fructification are seven; the *Calyx*, the *Corolla*, the *Stamens*, the *Pistil* or *Pistillum*, the *Pericarp*, the *Seeds*, and the *Receptacle* or *Receptaculum*. Of these, the four first belong to the flower, the two next to the fruit, and the last is common to both.

Every individual flower does not possess all of these; for in some, the *Calyx* is not found; in

* From *fructus*, fruit, and *facio*, to make.

some the Corolla; and, in others, other presumed deficiencies occur.

The *Calyx*, is that exterior part of a flower which encloses the Corolla previously to its expansion, and afterwards embraces and supports it.

The *Corolla*, consists of a leaf or leaves, termed petals, situated within the Calyx.

The *Stamens* are thread-like substances, enlarged at their summits, erect within the corolla.

The *Pistil* is a column crowned with its capital in the very centre of the flower.

The *Pericarp* is the vessel out of which the Pistil proceeds, and in which the seeds are nurtured and contained.

The *Seeds*, for the protecting and perfecting of which the whole process of fructification is designed, are the rudiments of new plants.

The *Receptacle* is the base upon which all the other parts of fructification rest; each of which assumes in different plants very different appearances, and which necessarily require special remark.

First,—The CALYX:* this is defined by Linnæus to be the “Outer bark of the plant, present in the fructification.” Many English

* From *καλυξ*, and originally from *καλυπτω*, to cover; and not from *καλιξ*, a cup, as some have supposed.

botanical writers have denominated this part, the empalement, and flower-cup. These terms are decidedly erroneous; the word flower-cup, if used, ought certainly to be restricted to one particular species of Calyx, namely, the *perianthium* or *perianth*; whereas the term *Calyx* is a generic term, comprehending various parts, very distinct in their appearances, and, perhaps, in their offices. Linnæus directs our attention to seven principal varieties of calyx, viz.: the *Perianthium*, the *Involucrum*, the *Amentum*, the *Spatha*, the *Gluma*, the *Calyptra*, and the *Volva*.

The *Perianthium** or *Perianth*, is the most common species of calyx, conveying more than any other the idea of a cup; this is most conspicuous in the *Primrose*, (*primula veris*,) and *Nicotiana*. (tobacco,) in each of which it is placed immediately under the flower.

There are three species of *Perianthium*, as enumerated by Linnæus, viz.:

The *Perianthium fructificationis*,
 ——— *floris*, and
 — — *fructus*:

These are again subdivided according to circumstances.

The *Perianthium fructificationis*, or perianth

* From $\pi\epsilon\rho\iota$, peri, around; and $\alpha\nu\theta\omicron\varsigma$, anthos, a flower.

of the fructification, includes both the stamens and the germe; that is, it contains each and all of the organs required for perpetuating the plant. This, as has been before stated, is the most common kind of perianth.

The *Perianthium floris*, or perianth of the flower, contains the stamens, but not the germe. This kind of perianth is exemplified in the Gaura, the Willow-herb, (*Epilobium*,) the Rose, the Apple, and many others; in fact, in all vegetables which have the germe, or seed bud, placed below the receptacle of the flower; illustrations of this peculiar character are shown in Figures 1 and 2, Plate 7.

The *Perianthium fructus*, or perianth of the fruit, contains the germe, but not the stamens. This is exemplified in Figure 2, of Plate 16.

Some vegetables have two perianths, in which case they exhibit both the *Perianthium floris*, and the *Perianthium fructus*; one perianth being appropriated to the flower, and the other to the fruit: illustrations of this fact are seen in the Linnæa, Clove-tree, Morina, and several others.

From the number of leaves of which the Perianthium is composed, it has received the following names:

Perianthium monophyllum, a one-leafed perianth,

as in Tobacco, Thorn-apple, and Primrose.

Perianthium diphyllum, two-leafed, as in the Poppy, Claytonia, and Fumatory.

— *triphyllum*, tri-leafed, as in the Dock, Magnolia, Tulip-tree, Annona or Papaw, Podophyllum pellatum, or May-apple, and the Alisma (Water-plantain).

— *tetraphyllum*, four-leafed, as in the Water-lily, the Heath, and Chieranthus (Wallflower).

— *petaphyllum*, five-leafed, as in Ranunculus, Bell., Flax, and many plants having more than one petal.

— *hexaphyllum*, six-leafed, as in Lion's leaf, Berberry, and Hillia parasitica.

— *heptaphyllum*, seven-leafed, as in Trientalis, or Winter-green.

— *octophyllum*, eight-leafed, as in Mimulus and Diapensia.

— *decaphyllum*, ten-leafed, as in Galax.

— *polyphyllum*, many leafed.

A *monophyllum*, or single-leafed perianth, is either

Integrum, that is, entire, or undivided, as in Genipa, Olax, and Statice Armeria (Trift).

Bifidum, cleft, or in two segments, as in Tuberosus Moschatel, Purslane, &c.

Trifidum, three-cleft, as in *Hermannia* and *Cliffortia*.

Tetrafidum, four-cleft, as in *Galium* and *Elephant's head*.

Quinqufidum, five-cleft, as in *Tobacco*, and the major quantity of flowers that are furnished with a calyx of one leaf.

Sexfidum, six-cleft, as in *Ginora Americana*.

Octofidum, eight-cleft, as in *Tormentil*.

Decemfidum, ten-cleft, &c., as in *Cinque-foil* and *Herb-bennet*.

Duodecemfidum, twelve-cleft, as in *Purple Loosestrife* and *Water Purslane*.

In respect to figure, the Perianth is either

Tubulosum, tubular, or in the form of a tube.

Patens, spreading.

Reflexum, reflex, or bent back; as in *Asclepias*, *Leontodon*, and *Ranunculus bulbosus*.

Inflatum, inflated, hollow, or puffed up; as in *Physalis* (*Ground Cherry*), and *Yellow-rattle* (*Rhinanthus*).

Globosum, globose, or globular, as in *Centaurea* (*Knapweed*).

Clavatum, club-shaped, as in *Silene*.

Erectum, erect, or upright, as in *Saponaria* (*Soap-wort*).

Expanded, as in *Ranunculus acris*, one of the plants commonly called *Buttercups*.

In regard to the Proportion it bears to the Corolla, the Perianth is,

Abbreviatum, abbreviated, or shorter than the tube of the Corolla; as in the *Tobacco** and the majority of plants.

Longum, long; or longer than the tube of the Corolla.

Medioere, or about the length of the tube of the Corolla.

At its apex, the Perianth is either

Obtusum, obtuse or blunt.

Acutum, acute or sharp.

Spinosum, spinous or thorny.

Aculeatum, prickly.

Acuminatum, acuminate or sharp-pointed; similar to a subulate or awl-shaped point.

With respect to its margin, the Perianth is

Integerrimum, entire.

Serratum, serrated, toothed like a saw; and

Ciliatum, having the edges guarded by parallel bristles longitudinally.

The Perianth has also received a variety of

* See Frontispiece.

names according to its surface; but these names having been amply explained in treating of the nomenclature of leaves,* there is no occasion to repeat them here.

The situation of the Perianth, with respect to the Germin, is

Superum, superior; when the Germe is under the lower part of the Perianth, and

Inferum, inferior; when the Germe is above the base of the Perianth.

As it regards its duration, the Perianth is either *Caducum*, caducous; or falling off before the complete opening of the flower; as in the Poppy, the *Podophyllum peltatum* (May-apple), and the *Hydrastis Canadensis* (Yellow-root.)

Deciduum, deciduous; or falling off with the flower; that is, with the petals, the stamen, and style; as in Berberry and the Cruciform flowers.

Persistens, permanent; or continuing until the fruit has attained maturity; as in Betony and many others.

In respect to its composition, the Calyx sometimes consists of a number of leaves, which are laid over each other, like the scales on a fish; this is, the *Perianthium imbricatum*, or imbricate

* Page 27, et seq.

Calyx. *Hawk-weed*, *Sow-thistle*, and many other syngenesious plants, furnish beautiful instances of this species of Calyx.

Sometimes the scales of the Calyx spread wide, being diffused on all sides, and not closely laid over each other, as in the preceding species; this last is the *Perianthium squarrosam*, or *Squarrose calyx*; of which we have examples in the *Thistle*, *Onopordum*, *Conyza*, &c.

In some plants, as in the *Pink*, *Coreopsis*, and others, the base of the Calyx, which is simple, is surrounded externally by a series of distinct leaves, which are shorter than its own; to this species of Calyx, Linnæus has given the name of *Calyx auctus*, and Professor Vaillant, *Calyx calyculatus*, an increased Calyx, or a calyced Calyx.

The *Perianthium scariosum*, or scariose Perianth, is a species of Calyx, which is tough, though thin, and semi-transparent; as in *Statice Armeria*, or Thrift; *Centaurea glastifolia*, &c.

The *Perianthium turbinatum*, is inversely conical, shaped somewhat like a Windsor pear; the *Grislea secunda* and *Memecylon capitellatum*, exhibit instances of this kind of Perianth.

The Perianth is also either proper or common.

Proprium, or proper, when belonging to but one flower; and

Commune, or common, when belonging to several flowers, collected together.

Some flowers, such as the *Amaryllis*, the *Tulip*, the *Lily*,* the *Medeola*, and many others of the liliaceous plants, are, by the strict Linnæan principles, considered to be destitute of the Perianth. This doctrine has been combated by many very intelligent botanical writers, and it may be admitted, that, as in many cases the Calyx and Corolla pass so insensibly into each other, it is not improbable Linnæus did not take the most minute care to observe, or was unable, like many of the present day, to determine where the Calyx ended and Corolla began. There will be opportunity, under the head of Corolla, to investigate this subject more closely.

In the greater number of plants the Perianth is single; but, in *Morina*, *Sarracenia*, and some of the plants of the *Mallow* family, as *Althæa*, *Alcea*, *Malva*, *Lavatera*, *Gossypium*, *Hibiscus*, &c., it is double.

The second species of Calyx is the *Involucrum*.† This is called by Dr. Martyn, *Involucre*. It is chiefly restricted by Linnæus to the umbelliferous flowers, and is defined by him, as a Calyx removed from the flower. But, that it is found on

* See Fig. 1, Plate 6.

† From the Latin word *involvere*, to involve, roll about, or wrap up.

other plants not umbelliferous, we have sufficient evidence, as in one or two species of the *Anemone*, and the *Passion-flower*. In the first of these, the involucre is numerously subdivided for the protection of the Corolla during the earlier stages of its life, at which period the flower droops; but as the plant advances to maturity, the Corolla becomes erect upon its stalk, and the involucre is then found situated about an inch or more below the flower and surrounding the stem.

In the *Passion-flower** there are three leaves, which are about the fourth of an inch remote from the *Perianth*, and are hence called leaves of the involucre; this has by some been called a double Calyx, and so in a certain sense it is, but the inner Calyx alone is the true *Perianth* of the flower; the other is properly called the involucre.

These exceptions, however, do not weaken the authority of Linnæus; and when he called the involucre a Calyx removed from the flower, he obviously meant that it was remote from the Corolla, and placed below the common receptacle, at the foot of what is called an Umbel;† (a

* See Plate 14, letter *e*.

† Umbelliferous is derived from the Latin word *Umbella*, a little shade, and *fero*, to bear.

collection of flower-stalks, diverging from one point, and each rising to the same height. Each of the foot-stalks is terminated by an Umbel, which is similar in its form and structure to the large Umbel, and is commonly, like it, furnished with an involucre.) When a Calyx of this kind is placed under the universal Umbel, it is called, by Linnæus, *Involucrum universale*, an universal involucre; when it is placed under the smaller or partial Umbel, it is denominated *Involucrum partiale*, a partial involucre; but neither of these are always present: in *Cherophyllum* (Cowparsley), the partial involucre only is present; and in the *Pastinaca* (Parsnip), neither universal nor partial involucre is seen. This organ has been called *Involucellum*, or involucret; and, by Dr. Withering, the *Partial Fence*.

In most of the umbelliferous flowers, such as the *Hemlock*, *Fennel*, *Anise*, and in other plants not strictly umbelliferous, as the *Cornus sanguinea*, English-dogweed, and other species of this genus, there is, besides the involucre, a proper perianth, which is situated under each of the florets, or small flowers, of which the Umbel is composed.

The involucre, as being composed of one or more leaves, receives its name accordingly, for example:

- Involucrum monophyllum*, a one-leaved involucre, as in *Bupleurum* (Thorough wax).
- *diphyllum*, a two-leaved involucre, as in *Euphorbia* (Sponge).
- *triphyllum*, a three-leaved involucre, as in *Butomus* (Flowering-rush), and the *Alisma* (Water-plantain).
- *tetraphyllum*, a four-leaved involucre, as seen in *Cornus*.
- *pentaphyllum*, a five-leaved involucre, as in *Daucus* (Carrot).
- *hexaphyllum*, a six-leaved involucre, as in *Hamanthus*, &c. &c.
- *dimidiatum*, dimidiate, or half-leaved involucre, is that which is deficient on one side; as in *Æthusa* (Fool's parsley).

As the involucre does not in many cases cover or enclose the rest of the parts of fructification previously to the opening of the flower, as is the case with the proper Calyx, it is difficult to say in what essential circumstance the involucre of those plants which are not umbelliferous, such as *Cornus* and some species of the *Anemone*, differs from the bractæ; and it would seem that Linnæus's principal reason for separating the involucre from the bractæ was this, that he

might make use of the former in drawing his generic characters of the umbelliferæ. There can be little doubt that he adopted this separation and distribution, in deference to the authority of Artedius, by whom it was first proposed; and, having adopted it, he was obliged, in defiance of all analogy, to call the involucre a species of Calyx, as he would otherwise have violated his established principle of drawing his generic characters from some part of the fructification.

The *Amentum** or *Ament*, is a questionable species of Calyx, which consists of a great number of chaffy scales, and which are dispersed along a slender thread, or receptacle; it has also been vulgarly called a Catkin, on account of its supposed resemblance to a cat's tail, (though the resemblance is as strong to the tail of many other animals as to that of a cat.) The French call it *Chaton*; and many botanists have denominated it *Catulus*.

The term, *Ament*, will be found to have been used by the great Tournefort before it was employed by Linnæus; and it is synonymous with the terms *Julus* and *Nucamentum*, which are employed by some writers. *

* *Amentum* is derived from the Greek word *αμμα*, *Amma*, a whip or thong.

Linnæus defines the Ament to be a composition of a Calyx, and a common receptacle; a fine specimen of which is seen in the *Betula populi-folia*.

It is clearly a species of inflorescence: the true Calyx is the squama or scale, to the interior concave side of which, the stamens and pistils are either jointly or separately attached, and by which, with the assistance of the common elongated receptacle, they are at first completely covered.

Examples of the Ament frequently occur in the 21st and 22d classes *Monœcia* and *Diœcia*,* the particular characters of which will be explained in the Fourth Part.

In this place, however, it is proper to observe that in the first mentioned class, the Ament supports both male and female flowers on the same^f root, or individual; this is seen in the *Horn-beam*, *Walnuts*, *Hickeries*, *Chesnut*, *Chinquëpin*, and many others.

In the class *Diœcia*, the Ament supports male and female flowers on distinct roots, or individuals, and this is the case in *Willows*, *Poplars*, and many others. The class also contains some plants, such as the *Pistachia-nut*, *Juniper-tree*, and *Ephedra* (Shrubby horsetail), the male flowers of which are formed into an Ament;

* See Plate 16.

whilst the female flowers are surrounded with a Perianth.

It not unfrequently happens, that in plants of the class *Monœcia*,* the male and female flowers are situated very close to each other; whilst in others they are separated to a considerable distance, but in both instances they are found upon the same root, or individual.

In the latter case, the Ament frequently supports flowers of one sort, while a calyx or perianth-kind supports the other. Thus, in the *Corylus*, or Hazel, the male and female flowers are placed remote from each other, upon the same root or individual; the male flowers form an ament, whilst the females are enclosed in a perianth.

Wherever the ament contains seeds, it hardens and enlarges, and thus affords a permanent protection to them until ripe: but where the ament contains the stamens only, it falls off as soon as the *anthers* have deposited their farina or pollen. The fir is an instance of the former kind, and the hazel of the latter. Nature has wisely ordained in these plants, producing both male and female flowers, that for their reproduction, the flowers should appear before the leaves, so that the farina or pollen of the *anthers* may be carried more securely by the

* See Plate 15.

winds, or may be more directly deposited by their own gravity or the *pistilliferous flowers*.

The *Spatha*, or Spathe, is derived from the Latin word *spatha*, meaning a sheath or scabbard. In *Palms* and *Aroideæ*, the Spatha is seated at the base of the spadix and wholly enwraps it. Professor Link considers it a modification of the petiole. The *Arum Maculatum* (lords and ladies), of the hedge-banks, is a beautiful example of the spatha; it bursts longitudinally, exhibiting its stem and flowers most conspicuously.

Linnæus enumerates the following species of this organ.

- Spatha univalvis*, one-valved spatha or a spathe, composed of one leaf, as in *Narcissus poeticus*, *Galanthus nivalis* (Snow-drop), *Arum*, and others.
- *bivalvis*, two-valved spatha or a spathe, composed of two leaves; as in *Stratiotes* (Water soldier).
- *imbricata*, imbricate spathe, or one composed of a number of scales placed similarly to the scales on a fish, as in *Musa*, or Plantain-tree.

According to the number of flowers which it produces, the spathe has received the following names.

Spatha uniflora, one-flowered spathe.

— *biflora*, two-flowered ditto.

— *multiflora*, many-flowered ditto.

The *Gluma*, or Glume; this is derived from the Latin word *gluma*, chaff, and is a species of calyx restricted to the gramina, or grasses; it is formed of valves, and embraces the seed, from which circumstance it might fairly be deemed more more scientific as well as more consistent to use the term *valvula* (valve); but, unfortunately, long-established error is difficult to be subverted, and many who were formerly advocates for this desirable substitution have ceased to be so.

This species of calyx which is also called the Husk, is frequently terminated by a stiff-pointed prickle, called the awn, or beard: according to the number of flowers the glume supports, it has received different names: such as

Gluma uniflora, one-flowered glume.

— *biflora*, two-flowered glume.

— *triflora*, three-flowered glume.

— *multiflora*, many-flowered glume.

Various appellations have also been given to the glume, corresponding with the number of its valves, viz.:

Gluma univalvis, univalvular, or one valved glume.

— *bivalvis*, bivalvular, consisting of two scales

or valves: and this is the most common species of glume.

Gluma multivalvis, multivalvular, or many valved glume; having more than two scales or valves.

The glume is generally green, if it varies it is called *colorata*, coloured.

The surface in some plants is *glabra*, smooth; and in others *hispida*, hisped, rough, and covered more or less with pili.

The *Calyptra*,* or calyptræ, is a doubtful species of calyx in the mosses covering the anthers. It resembles a hood, monk's cowl, or an extinguisher; it is to be observed that what Linnæus calls the anthers of the mosses, are generally and more properly considered as their capsules, or pericarps. In the process of vegetation, the most central of these bodies swells and bursts its membranous covering, the greater part of which is carried upwards on its point, while the seta, or (stalk,) on which the (theca) or capsule is supported lengthens.

The *Volva*,† or Ruffle, as Dr. Withering has called it, is defined to be the membranaceous calyx of a fungous plant. It is the covering of several sorts of mushrooms, which enfolds the

* Calyptra, from *καλυπτω*, to cover.

† Volva, from *volvere*, to roll round.

laminae; (gills;) this bursting from the edges of the pileus, (hat,) as the plant enlarges, afterwards rolls round the pedestal, affording a resemblance to a ruffle or fringe. The edible mushroom is, therefore, easily distinguished from the poisonous fungi, which, having no calyx, (*volva*,) their gills are visible, even when in the form of buttons, and their stems are devoid of this frill or volve, or of the ring-like mark it would leave if off.

The volva, when placed upon the mushroom near the cap, is called *approximata* or approximating.

When it is at a distance from the cap, it is called *remota*, or remote.

This calyx either falls off at the first opening of the plant, after its full expansion, or continues with the seed. The terms employed to express these periods of duration are *caducous*, *deciduous*, *persistens*.*

Examples of the Calyptra and Volva are in the lower divisions of Plate 18.

Secondly,—The *Corolla*; † this has been denominated, by some writers, ‡ *corol*; it is the second of the seven parts of fructification already

* For an explanation of which terms see p. 27, &c. on leaves.

† Corolla, in the Latin, literally signifies a little crown, garland, chaplet, or coronet.

‡ Dr. Darwin particularly.

enumerated, and is defined by Linnæus in one part of his writings to be “the liber or inner bark of the plant present in the fructification.”*

Some writers have rendered the term corolla by blossom:† but Dr. Martyn has observed, that blossom has too contracted a signification; being usually and more properly applied to the flowers of fruit trees alone. The petals of the corolla have frequently been called, both in common language and in the writings of poets and philosophers, “the leaves of the flower.” Thomson, Rittenhouse, and many others, may be quoted in proof of such; but this language is not sufficiently precise and specific for the purpose of science; and to avoid ambiguity, the term *corolla*, as derived from the Latin, should be continued, and the term petal as applied to the segments of the corolla, not departed from.

The corolla, according to Linnæus, consists of two parts, namely: the *Petolum* or petal, and the *Nectarium*, or Nectary. This last, however, is not always a part of the corolla.

Approximation of the Perianth to the Corolla.

In general, the corolla may be distinguished from the perianth, by the fineness of its texture and the brightness of its hue, the perianth (calyx), being usually thicker, rougher, and of a green colour.

* Philosophia Botanica, p. 52.

† Among whom is Professor Rennie.

To this rule, however, there are many exceptions: thus, in *Bartsia coccinea*,* the perianth is more deeply coloured than the corolla; the perianth of the *Fuchsia coccinea*, is a bright scarlet, and the corolla an indigo; the perianth of *Dombeya lappacea*, before the opening of the flower, is of a crimson colour, it afterwards becomes green, and the corolla is of a brownish violet colour; these instances are reversed in the *Daphne Laureola*, the corolla of which is green, and the calyx coloured; and in the *Bignonia radicans* (trumpet flower,) the perianth and the corolla are both of the same colour. It is, therefore, necessary, to have recourse to other marks by which these two parts of the fructification may be accurately discriminated.

Linnæus makes the distinction between the corolla and the perianth to consist in this circumstance, that the former has its segments or petals disposed alternately with the stamens; whereas the perianth has its leaflets arranged opposite to the stamens.

Dr. Milne, in his Botanical Dictionary, under the article Corolla, says "That this rule is founded on the natural situation of the parts in question, as will appear, by examining any number of

* Plate 10.

complete flowers, in the fourth and fifth class of the Linnæan method: in the former of these classes, the number four, in the latter, the number five is predominant; and as both Perianth and Corolla are present, the opposition and alternation alluded to become distinctly visible.”

Notwithstanding this, there is, on very many occasions, a great difficulty in distinguishing the corolla from the perianth; and in the *Philosophia Botanica*, pages 57 and 58, section 90, we find Linnæus himself renouncing his former opinions, and confessing that nature does not seem to have placed absolute limits in all cases between the calyx (perianth), and the corolla.

This can scarcely be denied; especially if it be untrue, that the calyx is exclusively derived from the outer, and the corolla from the inner bark: here is ample room for research, but not for speculation.

The learned Jussieu defines the corolla to be “That cover of the flower which is surrounded by the calyx, or which is very rarely unenclosed,” he says, it is a continuation of the liber, or inner bark, and not of the cortex or outer bark of the peduncle: that it is not permanent, but commonly falls off with the stamens, which involves or crowns the fruit, but never grows fast to it; and which almost always has its segments or divisions ranged alternately with the stamens.”

From this view of the subject, the coloured petals of the Narcissus, Hyacinth, and other liliaceous plants nearly allied to the Narcissus, are regarded by Jussieu as forming a true perianth; as indeed Tournefort had taught long before. Necker, too, sensible of the great difficulty which not unfrequently occurs in distinguishing the corolla from the calyx, has, in his *Corollarium ad Philosophiam Botanicam Linnæi spectans, &c.*, called both the corolla and the calyx by one name, viz.: *Perigynandra*, a term derived from the Greek, and signifying an envelope; he distinguishes the *Perigynandra*, when there are two such envelopes into the outer and the inner, the inner answering to the corolla, and the outer to the calyx of Linnæus.

The petals, under every arrangement, constitute the principal part of the corolla, and surround both the stamens and the pistils. They consist of one or more pieces, according to the number of which, the corolla has received the following names, viz.:

- Corolla monopetala*, monopetalous, or consisting of but one petal, as in the *Convolvulus** *Tobacco,** and many others.
- *dipetala*, dipetalous, or consisting of two petals.

* See Frontispiece.

Corolla tripetala, consisting of three petals, as in *Sagittaria*,* &c.

— *tetrapetala*, of four petals, as in the plants of the class *Tetradynamia*.

— *pentapetala*, of five petals, as in marsh-
marygold, the *umbellatæ*, &c.

— *hexapetala*, of six, as in the lily,† &c.

— *polypetala*, polypetalous, or consisting of many petals.

This last term is sometimes used by Linnæus, in opposition to the term monopetalous, and by many writers, it has been employed to describe a corolla of more than six petals. Of the polypetalous plants, some have nine petals, as in *Liriodendron*, and some an indefinite number, as in the *Water-lily*, and *Globe-ranunculus*.

When the corolla consists of only one piece, as in the monopetalous corolla, the whole corolla, in the Linnæan sense of the word, is a petal.

A flower which has no petals or corolla, is termed, *apetalous*; or *apetalous flos*, an apetalous flower. This term was adopted by Linnæus, from Tournefort; it is equivalent to the term *imperfectus*, or imperfect of *Rivinus*, *Knaut*, and *Pontedera*: the term *stamineus* of Ray; the *incompletus* of *Vaillant*; and the *capillaceous* of some other *Botanical* writers.

* Plate 15.

† See Fig. 1, Plate 6.

The existence of apetalous flowers has been proved by Christian Knaut, in his *Methodus Plantarum Genina*; but it is well known, that in some vegetables the flowers are entirely destitute of the petals; and if the opinions of Jussieu and some other botanists, concerning the calyx* and the corolla, be correct, it must be granted, that very many plants and some of them the most beautiful with which we are acquainted, are strictly apetalous.

The number of petals of which a Corolla consists is determined from the base of the corolla. The rule of Rivinus is to reckon as many petals as the parts into which the flower, when it falls, resolves itself. This criterion will, in most instances, be found very exact, but in some few cases it will be insufficient. The corolla of the *Vaccinium Oxycoccos* (Cranberry), has, unquestionably, only one petal; but the flower, upon falling off, resolves itself into four. From the difficulty that occurs in some instances, of determining whether a corolla consists of one or more petals, we find Tournefort considering the corolla of plants of the Mallow tribe to be *monopetalous*; whilst Linnæus regarded it as *pentapetalous*.

* Perianth.

The different parts of the Corolla are distinguished by different names, for example:

- The *tubus*, or tube, is the lower part of a monopetalous Corolla; as in Tobacco, &c.
- *unguis*, or claw, is the lower part of a many-petalled Corolla, by which it is fixed to the receptacle; as in the Lily, &c.
- *limbus*, or limb, is a term sometimes used, but improperly; for that to which it is applied is a border, or the upper dilated part of a monopetalous Corolla.
- *lamina*, which literally signifies a plate of metal beaten out thin by a hammer, is, in botanical language, applied to an upper border, or an expansion at the upper part of a many-petalled Corolla.

DIVISIONS OF THE COROLLA.

The Corolla in this respect may be

Bifida, bifid or two-cleft; each petal divided into two; as in Chickweed, &c.

Trifida, or three-cleft, each petal divided into three; as in *Holosteum succulentum*, and *Hypecoum*.

Tetrafida, four-cleft; as in *Cucubalus* and *Lychnis flos cuculi*.

Quinquefida, five-cleft; as in *Primula* (Primrose), *Lysimachia*, &c.

Multifida, many-cleft; as in *Trientalis Europæa* (Winter-green), this term is equivalent to the term *lacineatus flos*, (of Tournefort.)

Bipartita, two-parted; simple, but divided almost down to the base; as in *Stellaria* and *Cerastium*.

Tripertita, three-parted; simple, but divided into three parts almost down to the base.

Laciniata, lacinated; divided into segments, as in *Reseda* (*Mignonette*.)

REGULARITY OR EQUALITY OF PARTS.

In this respect the Corolla may be

Régularis, regular; that is, equal in the figure, size, and proportion of the parts; as in the Privet, Lilac, Jasmin, &c.

Irregularis, irregular; when the parts of the limb differ in figure, magnitude, or proportion, as in *Aconite*, *Lupin*, and *Dead-nettle*.

Inæqualis, unequal; having the parts corresponding not in size, but in proportion; as in *Butomus umbellatus*.

Æqualis, equal; when the petals are of the same size and figure; as in *Primula*, *Limosella*, &c.: there does not appear to be any essential difference between the terms *æqualis* and *regularis*; and, as Dr. Martyn has observed, the latter expresses the idea better.

Difformis, difform; anomalous, or irregular; when the petals, or their segments, are of different forms.

FIGURE OF THE COROLLA.

Globosa, globose, globular, or spherical; round like a ball; as in *Trollius* (*Globe-ranunculus*.)

Campanulata, campanulate; bell-shaped, protruding without any tube, as in the *Campanula*, *Convolvulus*,* *Antropha*, and others.

Infundibuliformis, funnel-shaped; having a conical border rising from a tube; as in *Lithospermum*, *Stramonium*, *Tobacco*,† &c.

Hypocrateriformis, salver-shaped; rising from a tube with a flat border; as in some of the plants called *Asperifolia*; in *Diapensia*, *Aretia*, *Androsace*, *Hottonia*, *Phlox*, *Samolus*, &c.

Rotata, wheel-shaped; spreading flat without any tube, and radiating from one centre; as in *Borago*, *Veronica*, *Physalis*, *Verbascum*, and others.

Cyathiformis; cylindrical, but widening a little at the top.

Urceolata, pitcher shaped.

Ringens, irregular, gaping; a one-petalled Corolla, the border of which is commonly divided

* See Fig. 2, Frontispiece.

† See Fig. 1, Frontispiece.

into two parts, the one longer than the other; the upper division is sometimes called the *galea*, or helmet; the latter, the *barba*; most of the flowers of the fourteenth class are furnished with this species of corolla.

Personata, personate, or masked; as in *Antirrhinum* (Snap-dragon.)

Cruciata or *cruciformis*, cross-shaped, consisting of four equal petals, which spread out in form of a cross. This species of Corolla is exemplified in most of the plants of the fifteenth class.

Papilionacea, or Butterfly-shaped; irregular, and most commonly consisting of four petals; as in *Pisum* (Pea), *Vicia* (Vetch.)

Rosacea, rosaceous, or rose-like; consisting of four or more regular petals, which are inserted into the receptacle by a short and broad claw; as in the Wild-rose.

Undulata, waved or undulated, but not in angles, as in *Gloriosa superba*, and *Gloriosa simplex*.

Plicata, plaited, or folded like a fan; as in *convolvulus*.

Revoluta, revolute; rolled back or downwards; having the petals rolled back, as in *Asparagus*, *Medeola*, and *Lilium*.*

Torta, twisted; as in *Nerium*, *Asclepias*, *Vinca* (Periwinkle,) &c.

* See Fig. 1, Plate 6.

MARGINS OF THE COROLLA.

These may be either

Crenata, crenate; as in *Linum*, *Dianthus*, *Chinensis*, &c.

Serrata, serrate; as in *Tilia*, *Alisma*, &c.

Ciliata, *ciliate*; as in *Rue*, *Menyanthes*, *Tropæolum*, *Gentiana ciliata*, &c.

SURFACE OF THE COROLLA.

In respect of its surface the Corolla is *villosa*, *tomentosa*, *sericea*, *pilosa*, *barbata*, *imberbis*, or *cristata*.*

SITUATION OF THE COROLLA.

In respect to its situation, the Corolla is—*supra*, superior; by having its receptacle above the germ: or *Infera*, inferior, by having its receptacle below the germ.

DURATION OF THE COROLLA.

In point of duration, the Corolla is *caduca*, continuing only until the expansion of the flower, and then falling off; *decidua*, when the petals fall off with the rest of the flower; *persistens*,

* Each of these terms has been explained under the head of the Nomenclature of Leaves, to which, at page 27 et seq., the reader is referred.

permanent, continuing until the fruit has attained maturity; and *marcescens*, (withering on the stock, without dropping; as in Campanula, Orchis, Cucumber, Gourd, Bryony, &c. &c.)

In some plants, even of the same species, the Corolla is very transitory; in others, it is more permanent. We are not acquainted with all the circumstances which thus essentially affect the longevity of the Corolla; it is, however, a well-known fact, that double flowers, in general, last much longer than single ones. Thus, in single Poppies, the Corolla falls off in a few hours, whilst in double ones it lasts for several days. The double blossoms of the Cherry last much longer than the single blossoms of the same tree.

COMPOSITION OF THE COROLLA.

In respect to its composition, the Corolla is

Composita, compound; consisting of several florets, included within a compound Perianth, and resting upon a common receptacle.

Ligulata, ligulate; or strap-shaped; when the florets have their corollets flat, spreading out towards the end, with the base only tubular.

Tubulata, tubulous; when all the corollets of the florets are tubular, and nearly equal.

Radiata, radiate; consisting of a disk, in

which the corollets or florets are tubular and also regular; and of a ray, in which the florets are commonly ligulate.

COLOUR OF THE COROLLA.

The Corolla, in different vegetables, assume every known colour.

THE NECTARIUM.

The *Nectarium*, or Nectary, is, according to Linnæus, the second part of the Corolla. It is considered by him as the melliferous part of the vegetable, secreting or containing a peculiar fluid which constitutes the principal food of bees, and various other species of insects.

By some writers, this organ has been called the "Honey-cup;" but this name cannot be applied to all species, since, in many plants, this part bears no resemblance whatever to a cup, or vessel of any kind. To the term Nectary, as a generic term, and equivalent to the Latin *nectarium*, there is less objection, especially as the word nectar, applied to a liquor of delicious flavour, is so familiarized in poetic language.

FORM OF THE NECTARY.

The Nectary assumes a variety of forms, in different species of vegetables. Thus, in many

flowers, it is shaped like the spur of a fowl. This is the

Nectarium calcaratum, of which we have examples in the following vegetables, viz. *Valerian*, *Hooded-Milfoil*, *Butter-wort*, *Larkspur*, *Violet*, *Fumatory*, *Balsam*, and *Orchis*.

A second form is that of a purse, somewhat globular, with a depressed line in the middle.

The *Nectarium ovatum*, is an egg-shaped Nectary.

— *turbinatum*, a turbinate Nectary.

— *curinatum*, a keeled Nectary; this kind being entirely distinct from the petals, is denominated *Nectarium proprium*, or a proper Nectary.

Sometimes the Nectary is really a part of the Corolla, since it lies within the substance of the petals. The following plants afford instances of this kind of Nectary, viz. *Fritillaria*, *Lilum*, *Swertia*, *Iris*, *Hermannia*, *Uvularia*, *Hydrophyllum*, *Myosurus*, *Ranunculus*, *Bromelia*, *Erythronium*, *Berberis*, and the *Vallisneria*. This is what Linnæus calls *Nectarium*, *Petallinum*, or *Petalline* Nectary.

In many plants, the Nectary is placed in a series of rows within the Petals, or Corolla, and yet is entirely unconnected with their substance; a Nectary, thus situated, is said, by Linnæus, to crown the Corolla. The following plants, among

many others, furnish examples of this kind of Nectary; viz. *Passiflora*,* *Narcissus*, *Pancreaticum*, *Ola*x, *Lychis*, *Silene*, *Stapelia*, *Asclepias*, *Cynanchum*, *Nepenthes*, *Cherleria*, *Clusia*, *Hamamelis*, and *Diosma*.

In the following plants, the Nectary is situated upon, and makes a part of the Calyx, instead of the Corolla, viz. *Tropæolum*, *Monotropa*, *Biscutella*, and *Malpighia*; in these the Nectary is called, *Nectarium calycinum*, or Calycine Nectary.

In some plants, the Nectary is situated upon the Anthers, or summits of the Stamens; from which circumstance one of the plants has received the generic name of *Adenantha*ra.

The Nectary of many plants is placed upon the filaments. This is the case in *Laurus*, *Dictamnus*, *Zygophyllum*, *Commelina*,† *Mirabilis*, *Plumbago*, *Campanula*, *Roella*, and others.

In the following plants, the Nectary is placed upon the germ, or seed-bud; viz. *Hyacinth*, *Flowering-rush*, *Stock*, and *Rocket*. This is the *Nectarium pistillaceum*, or pistillaceous Nectary.

In *Honey-flower*, *Orpine*, *Buck-wheat*, *Collinsonia*, or *Horse-weed*, *Lathræa*, *Mercury*, *Clutiæ*, *Kiggelaria*, *Sea-side Laurel*, and several others, the Nectary is placed upon, or attached

* See Plate 14.

† See Fig. 1, Plate 5.

to the common receptacle. This is the *Nectarium receptaculaceum*, or receptacular Nectary.

Linnæus considers as a true Nectarium, the tube, or lower part of the monopetalous, or one-petalled flowers; such as the *Datura*, *Nicotiana*,* &c.; because, in general, this part contains, and probably forms the sweet or honied liquor, which constitutes one of the alimentary articles of bees and other insects.

In many plants, such as *Ginger*, *Turmeric*, *Reseda*, *Grewia*, *Nettle*, *Vanilla*, *Willow*, and others, the Nectary is of an unusual construction, and cannot, with propriety, be referred to any of the preceding heads.

Among writers opposed to Linnæus, there has frequently been a disposition to regard him as less happy in his history of the Nectarium, than in his account of most of the other parts of the vegetable; and notwithstanding his position, that the Nectary is a part of the Corolla, it is certain that all flowers are not provided with this organ or appendage; and in many plants which possess it, there is no immediate connexion between the Nectary and the Corolla.

Upon the whole, the term *Nectarium* is an extremely vague one; and much deference is due to the judgment of Jussieu, who said, “the term

* See Fig. 1, Frontispiece.

ought to be rejected from the science of botany." It is greatly to be wished that some person, possessed of the requisite qualifications, would enter upon a careful investigation of the various species of Nectaries, and arrange them under some more appropriate names than those by which they are at present recognized. In studying the genera of plants, a correct knowledge of the various Nectaria is of very essential service. In some cases, indeed, it is indispensable: this is shewn in the genus *Ranunculus*, the essence of which consists in its Nectary, which is a small prominence, situated at the unguis, or claw, of each petal of the plant.

THE STAMEN.*

The *Stamen*, which some writers have called the *Chive*, is defined, by Linnæus, to be "an organ for the preparation of the Pollen."

In most flowers, the stamens are seated round the seed-bud, and consists, according to Linnæus, of three parts; the *Filamentum*, the *Anthera*, and the *Pollen*. In reality, however, the stamen consists of only two parts, the *Filamentum* and the *Anther*; the Pollen being merely a matter secreted by, or contained in, or upon, the Anther.

* The word Stamen is derived from the Latin *stane*.

THE FILAMENTUM.

The *Filamentum*, or Filament, and which receives its name from the Latin word *Filum*, a thread, is the more slender, or thread-like part of the *Stamen* which supports the Anther, and connects it with the flower. The term Filament is equivalent to that of *Stamen*, as employed by *Tournefort* and some other botanists.

The number of Filaments varies considerably in different vegetables. Some plants have but one *Filament*, some two, some three, while others have from twenty to a thousand.

FIGURE OF THE FILAMENT.

In point of figure, the *Filament* is *Capillare*, *Planum*, *Wedge-shaped*, *Spirale*, *Subulatum*, *Emarginatum*, *Reflexum*, *Lacinatum*, *Dentatum*,* *Mutilatum*, (mutilated, or having the rudiments only of a Filament;) and, lastly, *Barren*, and which is applied in cases of the absence of the Anther, or when a Filament has elevated one not charged with Pollen, as in some species of *Geranium*.

* For explanations of these terms, refer to Nomenclature of Leaves, page 27 et seq.

INSERTION OF THE FILAMENTS.

In regard to insertion the Filaments are,
Calyci opposita, opposite to the leaflets or segments of the Calyx.

Calyci alterna, alternate with the Calyx, or placed alternately with the leaflets of the Calyx.

Corollina, inserted into the Corolla.

Calycina, inserted into the Calyx.

Receptaculacea, inserted into the Receptacle.

Nectarina, inserted on the Nectary.

Stilo inserta, inserted on the Style, as in the plants of the class *Gynandria*.

PROPORTION OF THE FILAMENT.

In point of proportion the Filaments are

Æqualia, equal, all of the same length.

Inæqualia, unequal, some longer than others.

Connata, connate, conjoined into one body, so as to form a tube at the base; as in the plants of the class *Monadelphia*.

Longissima, very long, longer than the corolla.

Brevissima, very short, much shorter than the corolla.

Longitudine corollæ, of the same length as the corolla.

Longitudine calycis, of the same length as the calyx.

SURFACE OF THE FILAMENT.

In respect to its surface, the Filament is

Pilosum, hairy.

Villosum, villous.

Hirsutum, hirsute.

STRUCTURE OF THE FILAMENT.

As to its structure the Filament is *membranaceum*, membranous; or *nectariferum*, nectariferous.

DIRECTION OF THE FILAMENT.

In regard to its direction, the Filament is

Erectum, erect.

Patens, spreading.

Patentiusculum, somewhat spreading.

Patentissimum, very much spreading.

Arcuatum, in the form of a bow.

Connivens, converging, approaching the other filaments with the point.

Reflexum, reflected.

Declinatum, declined.

Inflexum, inflected.

Flaccidum, flaccid.

Assurgens, up-springing.

Ascendens, ascending.

Recurvum, recurved.

Incurvum, incurved.

THE ANTHER.

The Anther is the second part of the Stamen.

This is the part which Ray denominates the *Apex*, and Malpighi calls a *Capsula staminis*; the word *Anther*, however, is preferable: Linnæus defines it to be “a part of the flower charged with pollen, or loaded with farina.” Both these powders to the unassisted vision, are impalpable, (though the former is much the finer,) but viewed through a microscope of a high power, they are discovered to be composed of innumerable semi-transparent substances of various forms, in which, according to some writers, the embryo of the future plant is clearly observable. If this is to be relied upon, and there seems little room for doubt, the *pistillum* may be regarded as an organ whose only office is to protect and to nourish the pollen, which most decidedly is both of an exhalent and an absorbent quality.

It is exhalent, from throwing out humidity, and obtaining in return very large quantities of oxygen; from which it not only derives a vivific influence, and an expansive property, but also occasionally become specifically

too heavy for the filaments to support in their usual position.

It is absorbent, not only by imbibing the oxygen as above stated, but also from absorbing all the nectareous or mucilaginous fluid afforded by the anther, and by which the adhesive quality is destroyed: the means of connexion being thus annihilated, and an explosion of the anthers resulting from the expansive property acquired, the pollen becomes liable also to be scattered by the winds, and find protection from the pistils of various plants; this is the indirect yet general method by which the reproduction of vegetables is carried on; the other mode results apparently from the increased weight of the filaments above referred to, by which the filament is forced into an *Arcuatum*, or bow-like form, whereby the farina, (for protection only,) is more directly deposited upon the germ of the pistilliferous flowers.

The Anther, therefore, may be defined to be a vessel destined, for a season, to sustain in the most liberal sense of the word, the pollen. It commonly forms a part of the stamens, and is usually placed upon the top of the filament; but, it must not be forgotten, that in many plants the anther exists without any filament to support it.*

* This important subject will be further considered when the pistillum comes under consideration.

The number of anthers varies in different plants. The generality have one to each filament: to this rule the following plants are exceptions, viz.:

Mercurialis, or Mercury, and the *Ranunculus*, have two anthers to each filament; this is what Linnæus calls a twin-anther, (*anthera didyma*.)

Fumaria, has three to each.

Bryonia, has five anthers to three filaments, in this, a single anther is affixed to one of the filaments, and the remaining four anthers are equally divided between the other two filaments.

In the *Theobroma* or chocolate-nut, there are five anthers to each filament.

The *Pea*, *Bean*, *Vetch*, *Trefoil*, *Liquorice*, and many other flowers of the class *Diadelphica*, have, in general, ten anthers to two filaments; or, more properly speaking, to two sets of united stamens.

In the *Cucurbita*, or Gourd, there is one anther attached to three filaments.

In the *Dandelion*, *Fever-few*, *Groundsel*, and other really compound flowers, of the class *Syngenesia*, there are five anthers, which are united into a cylinder, to which is connected five distinct and separate filaments.

In some plants, some of the filaments are terminated by anthers, whilst others are destitute of these parts; thus, the two genera *Chelone*

and *Martynia*, are furnished with four complete stamens, together with the rudiments of a fifth filament, which is destitute of the anther. The *Verbena* has four filaments, two only of which are antheriferous. The *Bignonia Catalpa* of Linnæus, has two perfect stamens, or stamens with anthers; and three filaments which have no anthers.

FIGURE OF THE ANTHER.

In point of figure the Anther is

Oblonga, globosa, sagittate, angulata, cornuta, bicornis, linearis, acuta, acutiusecula, cordata, ovata, hastata, biloba, reniformis, bifida, bipartita, aristata, setifer, rostrata, truncata, obtusa, emarginata, acuminate, and furcata.

DIRECTION OF THE ANTHER.

In regard to direction the Anther is

Erecta, rigida, patens, assurgens, inflexa, nutans, declinata, pendula, incurva, connivens, and spiraliter-contorta.

INSERTION OF THE ANTHER.

As to insertion, the Anther is

Sessilis, versatilis, adnata, cylindræ, tubulæ, (as in the compound flowers of the class *Syngenesia*,) *cohærentes, incumbens, and lateralis.*

SUBSTANCE OF THE ANTHER.

In respect to substance the Anther is
*Membranacea, depressa, compressa, convexa, plana, sulcata, transversim sulcata, longitudinaliter sulcata, subulata and bilamellata.**

PROPORTION OF THE ANTHER.

In reference to measure the Anther is
Filamentis brevior, shorter than the filament.
Corolla brevior, shorter than the corolla.
Longitudine filamenti, of the same length as the filament.
Longior filamenti, longer than the filament.
Æquales or equal, when the anthers are all of the same size.
Longissima, very long, much longer than the filament.
Brevissima, very short, much shorter than the filament.

PROTECTION OF THE ANTHER.

In point of protection the Anther is
Tecta, covered, concealed by a scale of the arch, as in the *Asperifoliæ*, or rough-leaved plants,—

* Most of these terms have been sufficiently explained at page 27 et seq., under the head of the Nomenclature of Leaves.

Or *Inclusa*, enclosed, situated within the tube of the corolla;—but we also find very many anthers perfectly unenclosed.

CELLULAR CHARACTER OF THE ANTHER.

In regard to its cells and apertures the Anther is

Unilocularis, one-celled.

Bilocularis, two-celled.

Trilocularis, three-celled.

Bivalvis, two-valved.

Didyma, didymous, having its surface divided into two equal protuberances.

Sterilis, not possessing pollen.

Fertile, possessing pollen.

Apice, dehiscens, opening at the top.

Latere dehiscens, opening at the side; and Linnæus denominates the bursting of the anthers *Dehiscencia*.

SITUATION OF THE ANTHER.

It has already been stated, that the Anther is generally situated upon the tops of the filaments; in some plants, however, they are fixed to the middle or sides of the filaments; in many plants, having no filaments, they adhere to the stigma of the pistilliferous flower; whilst in others, alike destitute of filaments, the anthers are

fixed to the receptacle, and in some they are situated upon the nectary.

COLOUR OF THE POLLEN.

The colours of the Pollen are various, but the most common are different shades of *yellow*, *red*, and *purple*.

PARTICLES OF THE POLLEN.

The polleniferous particles also assume various appearances: thus,

In the *Helianthus*, (sun flower,) they appear like prickly balls.

In the *Geranium sanguineum*, like perforated globes of fire.

In the *Mallows* they resemble wheels furnished with teeth.

In the *Ricinus communis*, or *Palma Christi*, they are shaped like grains of wheat.

In *Viola tricolor*, they are angulated.

In the *Indian Corn*, they are flat and smooth.

In *Borage*, like a thin leaf, rolled up.

In the *Narcissus*, reniform, or kidney-shaped.

In *Symphitum* or Comfrey, like double globules.

This may be carried on *ad infinitum*, but sufficient has been advanced to illustrate the subject,

THE PISTILLUM.

The *Pistillum* is the fourth part of Fructification enumerated by Linnæus, and defined by him as “an organ adhering to the fruit, for the reception of the pollen.” “*Viscus fructui adhærens pro Pollinis receptione.*”*

The Pistillum, to which many have given the name of Pistil and Pointal, assumes the appearance of a column, or set of columns, and is commonly situated in the centre of the flower, within the stamens. When perfect, it consists of three parts, the *Germen*, the *Stylus*, and the *Stigma*.

A knowledge of the Pistil, as consisting of these collective organs, is of no less consequence in the study of Botany, than is a knowledge of the Stamens. In a physiological point of view, each set of these organs is entitled to an equal portion of our attention, since they are equally and conspicuously concerned in the business of perpetuating the species. The pollen of the Anthers would have been formed and secreted in vain, were there no *Germen* to receive and preserve it during the cold seasons of the year; for warmth is as necessary to its vitality, as space and nutriment are for its expansion. Linnæus has somewhat inconsistently, with other terms, called

* *Philosophia Botanica*, &c. page 53, sec. 86.

the Germen “a *Seed-bud*,” a Seed-bulb would be a more appropriate name, it being a receptacle furnished with a mucilaginous fluid in the form of globules, varying in shape, and by which the already vivified Pollen is sustained and forced on to sufficient maturity to withstand the effects of the common temperature of the common air.

This organ will be better understood by reversing the order in which it is usually subdivided, and letting it stand thus,

THE STIGMA, THE STYLE, AND THE GERMEN.

The Stigma is the summit of the Pistillum, which, by being in many cases of a greater diameter than the style, is capable of receiving a large quantity of the pollen; it may be said, with some modification, to resemble the upper part of a funnel; and since it is in all cases moistened with a clammy fluid, it is most admirably adapted to retain the pollen when deposited, and to assist its dilation.

The number of the stigmas is very different in different vegetables. Some have only one, some two, three, four, five, and even a larger number.

DIVISION OF THE STIGMA.

In respect to its division the stigma is *simplex*, *fissum*, *bifidum*, *trifidum*, &c., *partitum*, *bipartitum*, &c., *lobatum*, *bilobatum*, &c.

FIGURE OF THE STIGMA.

The figure of the stigma is either *capitatum*, *globosum*, *urceolatum*, *ovatum*, *obtusum*, *truncatum*, *oblique-depressum*, *emarginatum*, *planum*, *reniforme*, *orbiculatum*, *peltatum*, *coroniforme*, *cruciforme*, *stellatum*, *canaliculatum*, *concauum*, *umbilicatum*, *plicatum*, *radiatum*, *angulatum*, *striatum*, *plumosum*, *filiforme*, *capillare*, *convolutum*, *revolutum*, *flexum-sinistrorsum*, *flexum-dextrorsum*, *barbatum*, and *imberbe*.

PROPORTION OF THE STIGMA.

It is in this respect either *longitudine styli*, as long as the style, &c. &c. &c.*

EXPANSION OF THE STIGMA.

The stigma is either *Fimbriato-crispum*, curled or fringed.

Foliaceum, foliaceous; or like a leaf.

Cucullatum, cowled.

* All those terms have been before explained, either under the head of Nomenclature of Leaves, or other parts.

DURATION OF THE STIGMA.

The stigma is, in this respect,

Persistens, permanent; remaining until the fruit be ma'ture. Or,

Marcescens, shrivelling; remaining, but becoming withered; as in the greater number of plants.

THE STYLUS.

The Stylus,* or style, is the middle portion of the pistil, and which, when existing, connects the stigma with the germe. In many plants the style is not present, and, by supposition, therefore, is not absolutely necessary. When present, the style, in a great number of plants, is most unequivocally tubular; that is, there is an open and uninterrupted cavity leading from the stigma to the germe.

In others, however, no such duct has been discovered, even when the style has been examined by a powerful magnifier; but it does not follow hence, that no such duct exists. It may be too small to fall under the cognizance of our senses at all, or it may be visible only at

* From *στυλος*, a column

a particular period; namely, when the stigma receives the pollen. It is quite certain that, after the pollen has been deposited upon or within the stigma, the germen is its destination, and we know that it arrives there.

The style, like most other organs, varies in respect to number in different plants; some having but one style, some two, three, &c.; whilst others are furnished with many. In general, the number of the styles is equal to that of the germen; each germe being furnished with its particular style. This is the structure of the Compound flowers, the Cone-bearing plants, the Rose, the Ranunculus, the Liriodendron, or Tulip-tree, and many others. To this general rule there are exceptions: there are vegetables which have more than one style to a single germe, or seed-bud. There are again other plants, such as the *Asperifoliæ*, and most of the Lip-flowers, which have a single style common to many germen: and in some the style, at its origin, is single, but soon branches out into as many ramifications as there are divisions, or cells, in the cavity of the germe. This structure is discovered in the plants of the two families of Geranium and Mallow, and many of their relations, principally belonging to the class *Monadelpkia*.

PROPORTION OF THE STYLE.

The style may be,
Longissimus, very long; with respect to the
 stamens.

Brevissimus, very short.

Longitudine staminum; as long as the stamen.

Crassitie staminum; as thick as the stamen.

Crassus; thick with respect to the stamen.

Tenuis; slender.

DIVISIONS OF THE STYLE.

These are,

Simplex, simple; not divided.

Bifidus, bifid.

Trifidus, trifid.

Bipartitus, two parted, &c. &c.

FIGURE OF THE STYLE.

Teres, columnar;—*Cylindricus*, cylindrical;
 —*Capillaris*, capillary;—*Clavatus*, club-shaped;
 —*Subulatus*, subulate;—*Alatus*, winged;—
Tetragonus, four-cornered;—*Ensiformis*, ensi-
 form;—*Villosus*, villous.

DIRECTION OF THE STYLE.

The style assumes most, if not all, the directions which have been noticed in treating of the filaments.*

SITUATION OF THE STYLE.

In the greater number of plants it is,

In *Apice germinis* placed on the top of the germe. In others it is

Ad latus germinis, placed at the side of the germe, that is, the styles, which are numerous, proceed from within the side of their corresponding germes.

This structure is observable in the Rose, the Raspberry, Strawberry, Cinquefoil, Tormentil, and other plants belonging to the order *Polygynia*, in the twelfth class, *Icosandria*.

DURATION OF THE STYLE.

It is either

Persistens, permanent; remaining until the fruit be ripe, as in the plants of the class *Tetradynamia*; or

Deciduus, deciduous; falling off with the other parts of the flower, as in the greater number of vegetables.

* See page 120, &c.

THE GERMEN.

This important organ now comes under consideration. It constitutes the lower part or base of the pistil, and supports the style and the stigma. It is the seed-bud,* furnished with a capacity to receive, and nutriment to evolve the future plant, which, in its embryo state, is contained in the pollen; and which, after it has been deposited on the stigma, is conveyed from thence by the style, if it be present. When that sub-organ is absent, the pollen is directly received by the germen from and through the stigma.

Linnæus, in pursuing his favorite subject of the analogies which he deemed to subsist between animals and vegetables, seems here to have forgotten his own practical observations on the pollen; in which the embryo of the future plant, perfectly formed, is plainly developed.

In fact, neither he nor his followers seem to have been candid in treating of the economy of the interior of the Germen; and this appears to have arisen from a fear of shaking their favorite hypothesis as to the resemblance between the vegetable and animal creation. That this is nothing better than an hypothesis is shewn, first, by the organization of the pollen, as

* More properly *seed bulb*.

already described; and, secondly, by the fact that no microscopic observations have proved that the substance originally in the Germen to be such, as it must be, if Linnæus's theory be true. It is to be regretted that Linnæus so frequently indulged in the uses of terms which might, without any real injury to his favorite science, have been dispensed with. The ideas which they represent are in no respect essential to his system, but in truth have the effect of excrescencies and deformities; by introducing vague and fanciful analogies they detract from the severe truth and propriety by which it is in general characterized.

The general features of the Germe now claims our attention; it varies in respect to number in different plants: some plants have but one germe, some two, some three, whilst some have many more.

FIGURE OF THE GERME.

It is *Subrotundum, oblongum, ovatum, turbinatum, conicum, lineare, cordatum, obcordatum, globosum, fissum, bifidum, trifidum, partitum, bipartitum, angulatum, triangulare, didymum, compressum, acutum, rostratum, and subulatum.*

SURFACE OF THE GERME.

It may be either *Scabrum, villosum, or imbricatum.*

SITUATION OF THE GERME.

It is either *Superum*, superior; that is, included in the Corolla or the Calyx; or

Inferum, inferior, when placed beneath the corolla or calyx.

INSERTION OF THE GERME.

The various modes are thus named,

Sessile.

Pedicellatum, pedicelled, standing on a pedicle, or footstalk.

Setæ incidens, sitting on a bristle.

PROPORTION OF THE GERME.

Minimum, very small in proportion to the corolla.

Longitudine Stamina, as long as the stamens.

— *calycis*, as long as the calyx.

— *nectarii*, as long as the nectary.

THE PERICARPIUM.*

The *Pericarpium* or pericarp, is the fifth part of fructification enumerated by Linnæus, but it

* From the Greek word, περι, peri, around, and καρπος, karpos, the seed or fruit.

does not exist till a particular stage of the progress. The pistillum having received the farina of the anther in the manner before related, and the farina deposited, becoming enlarged, the organ at this period ceases to retain its former name (germen), and takes the appellation of Pericarp.

The Pericarp is consequently a most important organ, being designed for the purpose, as Ray says, of *guarding the seeds until they are ripe, and then committing them to the bosom of the earth, the air, or the waters.*

Some writers call this organ a seed-vessel, or seed-case; and both of these terms are appropriate and significant, but pericarp is more consonant to the prevailing language of botany.

Some plants are destitute of the pericarp. This is the case in the Asperifolia, or rough-leaved plants, in the Verticellate plants, and in the compound flowers: in these families, the place of the pericarp is supplied by the calyx, which encloses the seed and accompanies them to perfection.

Linnæus enumerates eight different species of pericarp, viz.:

The *Capsula*, *Siliqua*, *Legumen*, *Folliculis*, *Drupa*, *Pomum*, *Bacca*, and *Strobilus*.

The *Capsula*, or Capsule, is a membranous hollow pericarp, which spontaneously opens or splits in some determinate manner, differing in different vegetables.

In respect to its figure and substance, the capsule is as varied as any portion of the plant; and in splitting or opening, it is divided externally into one or more pieces, to which Linnæus has given the name of *valvæ* or valves. These valves form outer coats, shells, or covering of a capsule, or any other kind of pericarp, by the opening of which the seeds, when ripe, escape. According to the number of its valves, the capsule is *bivalvis*, two-valved, *trivalvis*, &c. &c.

The internal divisions of the capsule are denominated *Loculamenta*,* or cells; these are the chambers appropriated for the reception of the seeds. According to the number of these cells, the capsule is *unilocularis*, one celled, *bilocularis*, two celled, &c.

The partitions by which the capsule is thus divided into cells, are called by Linnæus *dessepimenta*. This membranous wall or partition is of various forms, and radiates from a column or pillar in the centre of the capsule, called

* From *loculamentum*, signifying a case, a drawer, a bag, &c.

columella; this organ takes its rise from the receptacle, and has the seed fixed to it all round.

Representations of different kinds of capsules will be found at Plates 3, 6, 10, 11, 12, and in the frontispiece.

The *Siliqua*, *Silique*, or *pod*, is a two-valved pericarp, having the seed fixed along both sutures.

The proper silique is bilocular, or two-celled, being furnished with a partition which runs the whole length of the pericarp. It is to be observed, however, that some pericarps which have the same form, take the name of Siliqua, although they have no partition, and, of course, are unilocular or one-celled, as in Fumitory (*Fumaria*), and Celandine, or *Chelidonium*.

Linnæus, as well as Ray, has distinguished the silique from the *silicula*, or silicle. These two pericarps do not essentially differ from each other: they vary only in form and size. The first-mentioned species is much longer than it is broad: examples of this kind of pericarp will be found in the following vegetables, viz.: mustard, radish, wall-flower (*Cheiranthus*), water-cresses, *Bignonia longissima*, and many others. The silicula or silicle is almost round, or, at least, makes a much nearer approach to the orbicular form, as in the *Lunaria* (satin-flower), in *Alyssum*

(mad-wort), *Thlaspi* (shepherd's purse), *Iberis* (candy-tuft), and others.

This difference in the form and shape of the silique and silicle, is assumed by Linnæus as the foundation of the two orders into which he has distributed the plants of the 15th class of his system.

In regard to the figure of the pericarp, (whether it be silique or silicle,) it is

Compressa, compressed.

Torosa, torose, swelling out into knobs.

Torulosa, swelling as above, but in a smaller degree.

Articulata, jointed, intercepted with tight joints.

The *Legumen*, or legume, is a pericarp of two valves, in which the seeds are fixed along one of the sutures only. By this circumstance, it differs from the last-mentioned species of pericarp, in which we have seen the seeds are fixed to both sutures.

The English word for the legume, is pod; and the pericarp of the pea, which is a true legume, is still called a peas-pod.

Both in figure and substance the legume partakes of the greatest variety; and the same

diversities of character which, in these respects, apply to other organs, are applicable to this.

This remark is applicable to proportion and structure.

Plants which are furnished with a legume, as a pericarp, are denominated *Leguminosæ*, or Leguminous plants.

The *Folliculus*,* or follicle, is a one-valved pericarp, which opens longitudinally only on one side, and has its seed loose within it, that is, not bound to the suture. We have examples of this kind of pericarp in the *genera* Nerium, Strapelia, Cynanchum, Periploca, Apocynum, Asclepias, Embothrium, Vinca (Periwinkle), and others.

The *Drupa*, or drupe, is a species of pericarp which is destitute of valves, and contains a nut or stone, within which there is a kernel. This kind of pericarp occurs chiefly in moist and succulent fruits, such as the plum, cherry, apricot, peach, and olive; but sometimes it is dry, as in the almond. To these two species of drupa, have been given the names of *Succulenta*, succulent or juicy, containing a fluid; and *Sicca*, dry or juiceless.

The term drupa is sanctioned by classical

* Which signifies a little bag, a husk of wheat, or other grain.

authority. It is employed by Pliny, who uses the word for the fruit of the olive.* It is also equivalent to the term *Prunus*, as employed by other botanists. The nut or stone, which in the drupe, is surrounded by the soft and pulpy substance, is a kind of woody cup, which commonly contains a single kernel, called *Nucleus*; and the hard shell which envelopes the kernel is denominated the *Putamen*.

The *Pomum*, or Pome, is a pulpy pericarp, without valves, but containing a membranous capsule, with a number of cells or cavities, for the lodgement of the seeds. This species of pericarp has no external opening or valve. At the end, opposite to the peduncle or footstalk supporting the pome, there is frequently a small cavity, to which horticulturists have given the name of the eye of the fruit.

The apple, pear, quince, gourd, cucumber, melon, and many others, furnish examples of this kind of pericarp.

The *Pomum* exhibits as many varieties of figure as the foregoing subdivisions of the *Pericarpium*; perhaps even more, for the form of fruits is immensely affected by climate and soil.

* Lib. 15, chap. 7.

With respect to its cells, this species of PERICARP is *triloculare*, three-celled, &c. &c.

The *Bacca*, or *Berry*, is a succulent or pulp; Pericarp, without valves, and containing seed which have no covering. The seeds, in this species of pericarp, are sometimes dispersed promiscuously through the pulpy substance, as in the *water-lily*; but they are more generally placed upon receptacles, or footstalks, within the pulp; as in the *Currant*, *Gooseberry*, *Raspberry*, *Hydrastis*, and many others.

The berry assumes a considerable variety of forms; and, according to the number of seeds which it contains, it is called

Monosperma, one-seeded.

Disperma, two ditto.

Polysperma, many ditto.

The berry is said to be proper or improper: proper, if formed of the pericarp or seed vessel; improper, if formed of any other part of the fructification. Thus, in the *Mulberry*, *Rose*, *Blite* (*Blitum*), and the *Myrtle-leaved Sumach* (*Rhus Coriaria*), the large and succulent calyx becomes a berry. In the *Strawberry* and *Cashew-nut* (*Anacardium*), the berry is formed from the receptacle: in the *Raspberry* and *Adonis*, it is

formed of a seed; in the Marvel of Peru (*Mirabilis*), it is formed of the nectary, and in the Garden Burnet (*Poterium Sanguisorba*), it is formed of the tube of the corolla, which hardens and shuts for the purpose.

Certain fruits, such as Mulberry, Raspberry, Blackberry, and many others, which are generally spoken of as simple berries, may, with more propriety, be denominated compound and spurious berries: for each of the component parts, which are called *acini*, or *granules*, may, very probably, be considered as a distinct berry, containing a single seed immersed in a pulpy substance.

The berry does not spontaneously gape or burst, as do the first four species of pericarp, which have been mentioned.

The *Strobilus*,* or Strobile, is the last species of pericarp enumerated by Linnæus; he defines it to be a pericarp formed from an ament, by the induration of the scales. This is the definition given in the *Termini Botanici*.

In the *Delineatio Plantæ* it is thus expressed: "Strobilus imbricatus amenti coarctati." That is, the strobile is made up of scales that are imbricated, or lie over each other, from an ament

* Strobilus signifies in Latin a Pine-tree, Pine-apple, an Artichoke; but it also signifies a whirlwind.

contracted or squeezed together; in this state of maturity, Dr. Martyn observes, "This term includes not only the cone of former writers, but also the fruits which recede considerably in structure from that sort of pericarp; as that of *Magnolia*, *Tulip-tree* (*Liriodendron*), and others:" but it must be evident that it is improper to translate *strobilus* by cone, since it assumes a variety of forms in different vegetables; but, from what has been previously said in relation to the forms of the numerous organs already considered, it is unnecessary here to advert to them particularly.

THE SEED.

The *Seed* is the sixth part, and it is the end and aim, of the fructification; it is to its production and security that all the other organs are subordinate.

It is, in fact, the pollen at maturity, which now only requires the fertilizing qualities of the earth, air, and water, to develop its capabilities and expand it into the perfect plant.

The number of the seeds is a variable circumstance in different vegetables. Some plants have only a single seed in each pericarp; some have two, others three, &c. &c.

In regard to the figure, size, surface, colour, consistence, and situation, what has already been advanced on those heads will be amply sufficient.

Seeds are divided into five parts:

The *Pappus*, *Coma*, *Cauda*, *Ala*, and *Crista*.

The *Pappus*, or, as the French term it, the *Aigrette*, is a sort of feathery crown, with which many seeds, especially those of the compound flowers, are furnished, evidently intended to facilitate the great business of their dissemination or dispersion.

The *Coma*, is very nearly allied to the pappus, for, like it, it is formed of a villous substance, which is placed upon the vertex of the seed, and collected into a bundle. According to Gærtner, it differs from a pappus, because in the coma the villous or feathery substance derives its origin from the shell of the seed, and not from the proper calyx of the flower; and because all the connate seeds are furnished with a true pericarp, as in Willow-herb (*Epilobium*), and others.

The *Cauda*, or Tail, resembles a slender stipe, proceeding from the vertex of the seed, having a feathery appearance from the base to the apex, and being in all cases longer than the seed.

The *Ala*, or wing, is a broad, flexible, and membranous expansion, fixed to the vertex, back, or sides of certain fruits and seeds, and

thus facilitating their dispersion. When it occupies the vertex and back, it is especially denominated a wing; but when it surrounds the sides, it is called a margin (*margo*).

Seeds which are furnished with wings, are called *unialata*, one-winged, two-winged, &c. &c. A membranous margin is not uncommon in seeds, and it is found in almost every form and shape.

The *Crista*, or crest, is very nearly related to the wing, but it is narrower, less flexible, and formed of a coriaceous or cork-like substance, and always placed at the back of fruits; according to situation and appearance, it has received various names.

Besides the seed, properly so called, two other kinds are referred to this general head by Linnæus, viz.: the *Nux* and the *Propago*.

The *Nux*, or nut, is a seed covered with a shell; the nut has an affinity, on the one hand, with the capsule, and on the other hand, with the drupe: from the capsule, it differs in the total want of valves, and, in the base, often having a scraped or filed appearance for some distance. From the drupe, it differs generally in the nakedness of the shell; or, if there be a rind, in the incomplete opening at its apex. Nuts are more

generally supplied with an involucre than any other species of pericarps; as in chesnut, beech, yew, juniper, hazel,* and others.

In regard to the character of the integuments: These, as to consistence and internal fabric, are very various.

The last general feature of the nut is, that it has no spontaneous opening before the germination of the seed; nor does the number of the valves, in any instance yet known, exceed two.

Propago is the name of the seed of the Mosses, upon which there exist some most conflicting opinions, but none of them appear to have much tendency to advance the science of botany; and if the term *Propago* were entirely expunged, it is probable that no inconvenience would result.

THE RECEPTACULUM.

The Receptaculum,† or receptacle, is the seventh and last part of fructification spoken of by Linnæus: he defines it “the base by which the other parts of the fructification are connected.” To this part of the fructification Boerhaave

The cup of the Acorn is called by late writers *cupula*.

† From *Recipio*, to receive.

gave the name of *Placenta*, and Vaillant that of *Thalamus*.

The following species of receptacle are enumerated by Linnæus, viz.:

Receptaculum proprium.

———— *commune.*

———— *umbella.*

———— *cyma.*

———— *spadix*; but

the last three will be treated of under a separate head, viz., that of *enflorescence*, or the mode of flowering; and the first two only considered in this place as receptacles.

The *Receptaculum proprium* is a proper or peculiar receptacle, appertaining to one fructification only. Of this kind is the receptacle of all the simple flowers. This species of receptacle has received different names, from the particular parts which it supports and connects: thus,

The *Receptaculum fructificationis*, or receptacle of the fructification, is common both to the flower and the fruit; or, in other words, embraces the corolla and the germe.

The *Receptaculum floris*, or receptacle of the flower, is the receptacle supporting the parts of the flower only. In these cases, the germen,

or seed-bud,* which is placed below the receptacle of the flower, has a proper base of its own.

The *Receptaculum fructus* is the receptacle of the fruit. Examples of this are seen in the Gaura, Oenothera, and others.

The *receptacle of the seed* is the base to which the seeds adhere; and this species of receptacle is denominated by Boerhaave, and some other botanists, *Placenta*, because it is the common receptacle of the vessels through which nourishment is conveyed to the seeds.

The *Receptaculum commune*, or common receptacle, connects several florets or distinct fructifications, so that, if one of them be removed, irregularity is occasioned. This receptacle is subject to great variety, both as to colour, surface, consistency, and size.

In drawing the generic characters of plants, the receptacle is a^{*} part which ought always to be attended to. It is seldom omitted by Linnæus in his *Genera Plantarum*, and in discriminating the genera of the class Syngenesia, it is a character of the greatest importance.

The next branch of our subject relates to vegetable inflorescence.

* Properly seed-bulb.

THE INFLORESCENTIA.

By the term Inflorescentia, Linnæus means the various modes in which flowers are fastened to the plant, by means of the peduncle. This is what Ludwig, and many other botanists, denominated *Modus Florendi*. These modes are thirteen in number, viz. *Spadix*, *Cyma*, *Umbella*, *Spica*, *Amentum*, *Strobilus*, *Corymbus*, *Racemus*, *Panicula*, *Thyrusus*, *Fascicuius*, *Capitulum*, and *Verticellus*.

The first three of these have already been mentioned under the head of receptacle: but the term receptacle, as applied to these, is most certainly a misnomer, and therefore they claim to be somewhat more particularly noticed in this place.

The *Spadix* proceeds from that species of calyx which is called Spatha, or Spathe. It is either branched (*ramosus*), as in the palms; or simple (*simplex*), as in *Arum maculatum*, and others.

The simple or unbranched *Spadix* displays some variety. Thus, in *Calla*, *Dracontium*, *Pothos*, and Golden club, the florets cover it on all sides. In *Arum maculatum*, and others, they are disposed on the lower parts exclusively; and in *Zostera marina* (Grass-wrack), on one side only.

According to the number of florets which it supports, the Spadix is called Uniflorus, one-flowered; Biflorus, two-flowered; and multiflorus, many flowered.

The *Cyma*,* or cyme: this is a compound flower, composed of several florets sitting on a receptacle, producing all the primary peduncles from the same point, but having the partial peduncles scattered or irregular; some fastigate, and others forming a flat surface at top. We have instances of the Cyme in the wild Guelder rose (*Viburnum opulus*), in common Elder (*Sambucus nigra*), in *Ophiorhiza*, and various species of Cornel or Dogwood, &c.

The Cyma is sometimes furnished with bractes, and sometimes not. When flowers are disposed in a Cyme, they are called *Cymosus flos*, or Cymose flowers.

The *Umbella*, or umbel, is an inflorescence stretched out upon filiform proportioned peduncles from the same centre. This organ has been treated of under the head of Involucrum or Involucre. Several circumstances, however, respecting the Umbel, are worthy of being particularly noticed here.

The Umbel may be

Simplex, simple; or undivided; as in Ginseng

Cyma signifies a sprout or tender shoot.

(*Panax quinquefolium*), *Hyrocotyle* (Whiterot), *Bupleurum tenuissimum* (Harc's ear), and *Caucalis nodosa* (Knotted parsley.)

Composita, compound; each peduncle bearing another little Umbel, or Umbellule. In this case, the first or larger set of rays constitute the universal Umbel (*Umbella universalis*); while the second or subordinate set of peduncles constitute the partial Umbel (*Umbella partialis*.)

Prolifera, proliferous, super-decompound; or more than decompound.

The *Umbella* may be also *concava*, concave; *fastigiata*, fastigiate, or rising gradually like the roof of a house; *convexa*, convex; *erecta*, erect; *nutans*, nodding; *terminalis*, terminal; *axillaris*, axillary; and *oppositifolia*, oppositifolious.

Flowers which grow in the manner of an Umbel, are called *Umbellati*, umbellate, or umbelled flowers; and by many writers they are denominated Umbelliferæ, Umbelliferous, and Ferulaceæ.

The *Spica*, or spike, is a species of inflorescence in which sessile flowers, or flowers without peduncles, are scatteringly alternated on a common simple peduncle; examples of this mode of inflorescence are seen in the ears of Wheat, Rye, Barley, and many other grasses; and also in *Lavendula* (Lavender), *Verbascum*, Mullein, Agrimony, and many other plants.

The flowers of a Spike are situated immediately upon the stalk, without any partial peduncles or footstalks, as has already been observed. This circumstance distinguishes this mode of inflorescence from the raceme. It often happens, however, that they are in a Spike; and, along with the Sessile flowers, we find others that are pedunculated, as in some species of *Cyperus*, &c.

The *Spicula*, spicule, or spikelet, is a partial spike, or a subdivision of a true spike; this occurs in some of the grasses, as Darnel, &c.; the filiform receptacle, which connects the florets longitudinally into a spike, is denominated *Rachis*.

Of the *Ament* and *Strobilus* particular and sufficient notice has already been taken when treating of the various species of Calyx,* and of the Pericarp;† but it is necessary to observe, in this place, that the Ament is more properly referrible to the head of Inflorescence than that of Calyx.

The *Corymbus*, or as Dr. Martyn calls it, Corymb, is said by Linnæus to be “made up of a Spike, whilst each flower is furnished with its proper footstalk, or peduncle, in an elevated proportioned situation.” This is not very intelligible, and hence different botanists have given

* See page 84.

† See page 147.

different interpretations of his words. In this *species of Inflorescence*, the smaller or partial *flower-stalks* are produced along the common *stalk*, on both sides; and although they are of unequal lengths, they rise to the same height, so as to form at the top a flat and even surface. Examples of this mode of flowering is seen in the following: *Spiraea opulifolia* (Nine bark or Seven bark), *Cochlearia officinalis* (Scurry-grass), *Myosotis sativum* (Gold of pleasure), and many other tetradynamous plants.

*The Corymb differs from the Umbel in this circumstance, that in the former the numerous partial footstalks take their origin from different parts of the common stalk; whilst in the latter, as we have already seen, all the peduncles proceed from a common centre. The Corymb, it has been mentioned, is a mean between the Umbel and the Raceme.** Like them, its flowers are furnished with their proper footstalks, which rise gradually from the bottom to the top, as do those of the Raceme, and are extended to the same height, as are those of the Umbel.

Racemus, † Raceme, or Cluster, is the name of the eighth species of Inflorescence, enumerated

* As the Cyme is between the Umbel and the Corymb.

† Racemus, in Latin, signifies a cluster, or bunch of Grapes, &c.

by Linnæus. It is a species of flowering in which the flowers, placed along a common footstalk, are furnished with short proper footstalks that proceed as lateral branches from the common stalk. This member is closely allied to the Spike, for in both the flowers are placed along a common footstalk, or receptacle; but in the Spike, as we have seen, the flowers are sessile; whereas, in the Raceme, they are pedunculated. In general, too, the flowers are less abundant in the Spike than in the Raceme; but to this there are many exceptions.

This organ is *simplex*, simple; or *compositus*, compound; *Unilateralis*, one-sided, having all the flowers growing on one side of the peduncle; as in *Pyrola secunda* (serrated winter-green); *Secunda*, all bent or directed in the same way; *Pedatus*, pedate; *Conjugatus*, conjugate; *Erectus*, erect; *Laxus*, loose; *Dependens*, hanging down and pointing to the ground; *Nudus*, naked; *Foliatus*, leafy.

Good and familiar examples of the Raceme are found in the Vine, Currant, and different species of Prunus or Plum, such as the common Wild-cherry, (*Prunus virginiana*), and the *Prunus padus* (Bird-cherry,) &c.

The *Panicula*, or Panicle, is the name of the ninth species of inflorescence. In this the flowers or fruits are scattered on peduncles, variously

subdivided. In other words, it is a kind of branching or diffused spike, composed of a number of small spikes, which are fixed along a common receptacle, or footstalk. Instances of this form of inflorescence is seen in Oats, Panicgrass, and many other plants.

The following are the principal species or varieties of panicle enumerated by botanists:

Panicula congesta, a heaped panicle, having a great abundance of flowers.

— *densa*, a dense or close panicle, one on which the flowers are both close and abundant.

— *spicata*, a spiked panicle, approaching in form to a spike, as in many grasses.

— *contracta*, a contracted panicle, and closer in a great degree than the foregoing.

— *coarctata*, a squeezed panicle, having the peduncles extremely near to each other.

— *patens*, a spreading panicle, having the peduncles spreading out so as to form an acute angle with the stem.

— *diffusa*, a diffused panicle, having the peduncles spreading out more and more irregularly.

— *divaricata*, a divaricating panicle, spreading out still more; at an obtuse angle with the stem.

The *Thyrus*, or Thyrese, is a mode of inflorescence very closely allied to the panicle, being, in fact, a panicle contracted into an ovate, or egg-shaped form. In the thyrese, the middle footstalks, which are the longest, extend horizontally, whilst the upper and lower ones are shorter and rise up vertically. We have instances of this beautiful species of inflorescence in Lilac (*Syringa Vulgaris*), in Butter-bur (*Tussilago Petasites*), and other plants.

The *Fasciculus*,* or fascicle, is a species of inflorescence in which several upright, parallel, fastigate, approximating flowers are collected together, as in Sweet William (*Dianthus barbatus*), and others.

The *Capitulum*,† or head, is that species in which several flowers form a kind of ball, or head, at the extremity or summits of the footstalk, as in *Globe amaranthus*, *Gomphrena globosa* (Bachelor's buttons), and some species of Trefoil (*Trifolium*), and wild thyme (*Thymus serpyllum*).

The *Capitulum* is either

Globosum, globular or round, as in *Gomphrena globosa*.

* Diminutive, (from *fascis*, a bundle.)

† *Capitulum*, in Latin, signifies a little head, the top or chapter of a pillar, &c.

Dimidiatum, halved, hemispherical, or resembling half a head, as in *Lippia hemisphærica*.

Ovatum, ovate, as in *Lippia ovata*.

Hispidum, hispid or bristly, as in *Clinopodium vulgare* (Field-basil).

Foliosum, leafy, intermixed with leaves.

Nudum, naked, having no leaves.

Pedunculatum, peduncled, furnished with little footstalks, as in *Teucrium pumilum*.

Pyramidatum, pyramidal, shaped like a pyramid, as in *Lippia Americana*.

Subrotundum, subrotund, or roundish, as in *Selago fruticosa*.

The *Verticillus*,* is the thirteenth and last species of inflorescence noticed by Linnæus. It is called in many cases the whirl or whorl.† It is made up of many subsessile flowers, which surround the stem, in the form of a ring.

Examples of this inflorescence is seen in the *Mentha pulegium* (Pennyroyal), *Marrubium vulgare* (Horehound), *Callicarpa Americana*, and other plants.

The *Verticillus* may be

Sessilis, sessile, without peduncles.

* From *verto*, to turn.

† It is commonly written whorl: but whirl must be the most proper, since, as Dr. Martyn says, "It must be derived from the verb to whirl, and which signifies to turn rapidly," an expression indicative of its appearance.

Pedunculatus, peduncled, with peduncles.

Nudus, naked, without involucre, bractæ, or bristle.

Bracteatus, bracted, furnished with bractes.

Involucratus, involucred, furnished with an involucre.

Confertus, crowded.

Distans, distant.

Remotus, remote.

This subject cannot be properly closed without observing that, in some plants, the flowers grow upon the leaves: this is the case in the genus *Ruscus*, or Butcher's broom. Linnæus does not recognize this as a species of inflorescence, (but such it seems entitled to be called;) and yet he calls it "leaf-bearing."

A similar mode of flowering occurs in *Osyris Japonica*, a native of Japan. Professor Thunberg, who observed it in this vegetable, speaks of it as a rare species of structure in the vegetable world.

