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AN EASY
INTRODUCTION
TO THE SCIENCE OF
BOTANY,
THROUGH THE MEDIUM OF
FAMILIAR CONVERSATIONS
BETWEEN
A FATHER AND HIS SON.

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PREFACE.

BOTANY is a Knowledge of Plants, and is a term derived from the Greek, meaning an *Herb*. A scientific knowledge of this kind produces a more accurate acquaintance with their composition and uses. In the acquirement of such knowledge, the mind is expanded, the memory increased, and the constitution invigorated.

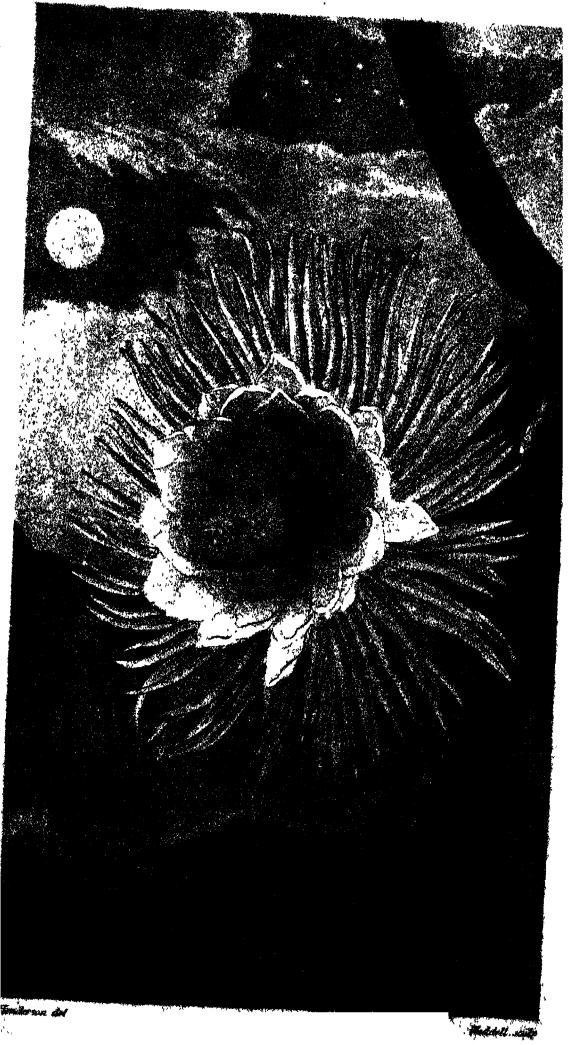
The Botanist beholds order and contrivance, where the uninformed spectator sees but the splendor of colour.

He is enabled to read works expressed in a scientific form; whereas, without such knowledge, all Botanical Works, even Voyages and Travels, must otherwise appear but a mere jargon of words.

He finds, that “all is done in order,” and rises from the contemplation of flowers, to the consideration of the adorable perfection and goodness, which could bestow so much grace and art, even on the lowest orders of created beings.

Even our Lord, when addressing his disciples, speaks of them in words of admiration.

Observe the rising lily's snowy grace,
Observe the various vegetable race,
They neither toil, nor spin, but careless grow,
Yet see how warm they blush, how bright they
blow.



Waldman 64



Howe's art and

Howe's art and

White Lily

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JUVENILE BOTANY.

FIRST CONVERSATION.

ON THE COMPOSITION OF FLOWERS.

Son.—WHAT is that part I see in the centre of the flower, looking at the WHITE LILY ?

Father.—It is called by Botanists the PISTILLUM.

Son.—What is the derivation of the word *Pistillum* ?

Father.—I know you, my dear son, will smile at this word, which appears very pedantic, for it is derived from the Latin word *Pistillum*, meaning our common *Pestle*, the instrument which chemists use to pound medicines in the mortar.

Son.—How comes this part to have that simple appellation ?

Father.—From a supposed resemblance, as this part has often *two swellings*, like that instrument, and the *intermediate part smallest*.

Son.—Is the *Pistillum* then usually composed of *three* parts?

Father.—Yes, and the upper part is called the *Stigma*.

Son.—Why has this part obtained that name?

Father.—Because this part is supposed to resemble that instrument with which they branded run-away slaves, called a *stigma*, which was a mark of disgrace; hence our English words, *stigma*, and to *stigmatize*. Thus we burn criminals in the hand, which we call marking in the hand.

Son.—What is that other bump, or swelling, at the bottom of that part, which I see in this LILY?

Father.—It is called the *germen*.

Son.—Why that name?

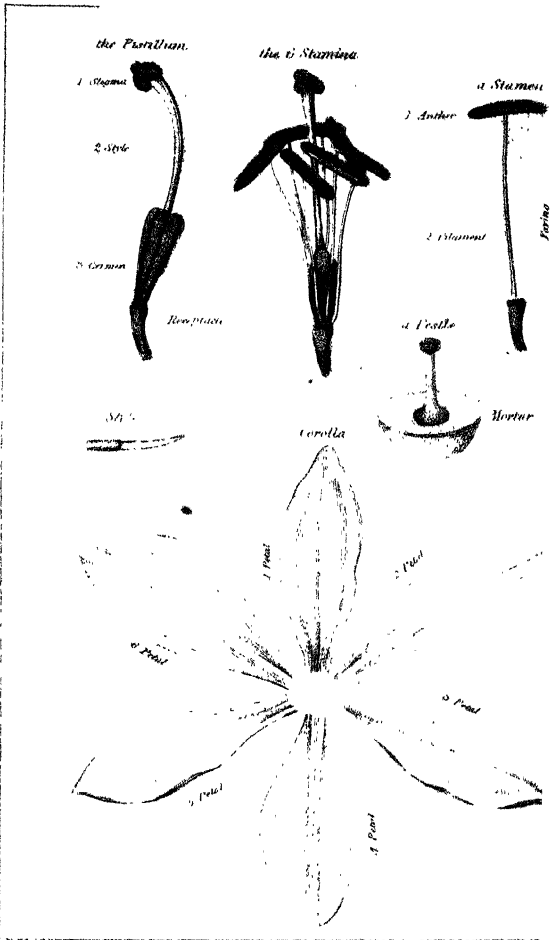
Father.—*Germen*, in Latin, means a *bud*, the rudiment of what is hereafter to appear; hence our English word, to *germinate*, to sprout out.

Son.—What is that *intermediate* substance called betwixt the *stigma* and *germen*?

Father.—It is called by Botanists the *style*.

Son.—Whence is that word derived?

Father.—From the Roman word *Stylus*, which was an instrument used by the Romans



Linnaeus del

1768

Diagram of the White Lily

to write on their tablets of wax; hence our English word style, as a good or bad style.

Son.—What part is this esteemed to be by Botanists?

Father.—It is called the *Female*, or *Lady* in the Flower, as the *Germen* contains the young seeds in embryo.

Son.—What are those parts which I see surrounding the *pistil*, occupying the *second circle*?

Father.—These are called STAMENS, or STAMINA.

Son.—When there is only one, what is the appellation?

Father.—*Stamen*, which is a Latin word, meaning foundation, from *stare*, to build upon.

Son.—Why this name?

Father.—Because as being the *mule part* of the flower, as man is called the Lord or Head of Creation, so this is the *foundation*, or *principal part* of the flower.

Son.—Of how many parts is a *stamen* usually composed?

Father.—Of *two*; the *anther* above, and *filament* supporting it.

Son.—How is the *anther* known?

Father.—As containing the *pollen*, or fine powder, called also *farina*.

Son.—What is the derivation of the word *anther*?

Father.—From the Greek word *ανθος*, *anthos*, the flower; hence our appellation *Polyanthus*, from *Πολυς*, *polus*, *many*; and *ανθος*, *a flower*, as having many flowers. This part is the essence of the flower; hence called the flower itself.

Son.—Is it a kind of box?

Father.—Hence formerly called *theca*, from *θεικα*, a box, a powder-box; also *capsule of the stamen*. The generality of plants have a single anther; but the Crack Willow, or *Salix Fragilis*, a double anther; Fumatory, *Fumaria*, has three together; Bryony, *Bryonia*, five. The anthers are furnished with one or more cells (*loculi*) for containing the farina or pollen; that of Mercury has *one* cell; Hellebore *two*; Orchis *three*; and Fritillaria *four*.

Son.—What are the derivations of the words *pollen* and *farina*?

Father.—*Pollen*, in Latin, is the finer sort of wheat offered at sacrifices, and *farina* is the coarser sort.

Son.—These fall in globules?

Father.—Yes, and are extremely minute and very hard; and are as various in shape as any boxes in the world, or rather shells.

JUVENILE BOTANY.

Son.—How is this known?

Father.—By examination with a microscope, when their variety of forms will be obvious.

Son.—What are these appearances?

Father.—In general these particles are oval; in the *Sycamore*, they resemble a cross; in the *Comfrey*, two balls, joined together; the *Geranium*, a sea-shell; the *Jonquil*, a kidney; the *Lily*, a long oval; and the *Violet*, as so many boxes.

Son.—The *aura*, or *fovilla*, is contained within these boxes, or particles of *farina*?

Father.—Yes; and when these globules come into contact with moisture, they explode, and give out this finer powder or exhalation.

Son.—How is this observed?

Father.—Even by the naked eye, when this moisture or water may be seen tinged with the colour of the *pollen*.

Son.—Is the *pollen* of different colours?

Father.—Yes; yellow in the *Lily* we are examining, and this is so in most flowers; yet green or black in the *Tulip*; a bright orange in the *Orange Lily*; white in the *Veronica* and *Kalmia*.

Son.—The *anther* opens to throw out the *farina*?

Father.—Yes; and differently in different flowers. In the *Lily* it folds back, like the

leaves of a book turned open, containing powder within these leaves, and so differently in different flowers.

Son.—Why all this curious contrivance in plants?

Father.—In order that the observers of Nature may have abundant pleasure in scrutinizing the works of the Creator.

Son.—What is the name of that fine *pillar* which supports the *anther*?

Father.—This part is called by Botanists the *filament*.

Son.—As you have kindly explained the origin of the different words used in Botany, which makes the study less frightful, why this appellation?

Father.—*Filamentum*, in Latin, means a *thread*; hence our English word *filament*, a fine thread, which this part is supposed to resemble.

Son.—The *anther* is elegantly suspended by this *thread* or *filament*.

Father.—Yes; hence the anther vibrates at every gale, in order to throw out the pollen.

Son.—As the *pistillum* was called the *female*, are the *stamens* called the *gentlemen* in the plant?

Father.—So they are denominated by all scientific Botanists.

Son.—Are flowers then *male* and *female*?

Father.—"Male and female created he them," relates to all animated nature, extending even to plants.

Son.—Is there any thing indelicate in learning that plants are *male* and *female* ?

Father.—The constitution of Nature being the appointment of an All-wise and All-mighty Creator, there can be no impropriety in such knowledge, which pervades the universe; and hence the names of king and queen, of father and mother, brother and sister, uncle and aunt, of the god, Jupiter, the goddesses, Juno and Venus, and so on; all which words suppose discrimination of sexes.

Son.—Do not such ideas as to plants elevate the mind, as to the power of the Deity ?

Father.—Certainly; flowers, by being thus constructed, appear higher in the scale of beings, and the power of the Deity more conspicuous; and whatever raises our minds to an admiration of his wisdom and goodness, ought to render us more devout and virtuous.

Son.—Can the science of Botany be taught without such a reference ?

Father.—Certainly not the Linnæan system, which has prevailed over every other, and which fixes its foundation upon such a knowledge.

Son.—How is this Lily called by him ?

Father.—*Bisexual*, as having *stamens* and *pistillum* in the same plant.

Son.—Are all plants bisexual?

Father.—No; some are *unisexual*, when the *stamens* and *pistils* are in separate flowers.

Son.—Pray give me an example of such contrivance.

Father.—Yes; we see it in our *Cucumber*, the common *Spinach* of the garden, and in the oblique-leaved *Begonia*.

Son.—I know plants are now *bisexual* and *unisexual*; are the pistils all formed as here explained?

Father.—No; sometimes the *style* is wanting in the *pistillum*.

Son.—Please to give me an example.

Father.—As in the common field *Poppy*, and *Tulip*.

Son.—Have all pistils then the *germen* and *stigma*?

Father.—Yes; these constitute the essence of the pistil, none being found wanting the *germen* and *stigma*.

Son.—When *the style is absent*, what do Botanists call the *stigma*, so circumstanced: for I see now that Botanists have a language of their own, and I begin not to be so alarmed at their hard words?

Father.—It is then called *sessile*, from *sedeo*,

to sit: stigma *sessile* means the stigma directly seated upon the germen.

Son.—Is the filament sometimes wanting in the stamen?

Father.—Yes, sometimes.

Son.—How is the *anther* called *without the filament*?

Father.—It is called *sessile*, as in *Canna Indica*.

Son.—Have these parts any other names than that of *stamen* and *pistil*?

Father.—Yes, some use *chives* for stamens, and *pointal* for pistillum.

Son.—Oh! I like these terms much, and they have nothing to do with sexes of plants.

Father.—You find these in most elementary books, even in those lately published; but they should be reprobated, as the use of language is not only to acquire, but also to communicate knowledge to others.

Son.—Why not abolish the other terms, and use these, more especially as they do not relate to the sexes of plants?

Father.—And pray who put this wise notion into your head?

Son.—Why, my aunt *Prulery*; who would have all the scientific books on Botany put into the fire.

Father.—Tell her from her brother, that such refinement of knowledge is highly absurd. Tell her to read Haley's "Essay upon Old Maids," where she will find such notions properly ridiculed; for if such a refined delicacy goes on, we must change our common words, tom-cat and she-cat, the lord mayor and lady mayoress, and man and woman, husband and wife, lion and lioness, and peacock and peahen, into some neuter words, adapted to modern sentiments of virtue.

Son.—But, Papa, is it not wicked for ladies to study Botany?

Father.—Miss Mary Wollstonecraft, when this same question was put to her, thus elegantly exclaims, to the lady who asked the question, whether females could be instructed in the modern systems of Botany? expecting for answer, "they could not;" "Thus," I said, "is the fair book of knowledge to be shut with an everlasting seal! On hearing similar expressions I have reverentially lifted up mine eyes and heart to Him who liveth for ever and ever, and said, O my Father, hast Thou, by the very constitution of our nature, forbid Thy child to seek Thee in the fair forms of truth? And, can her soul be sullied by the knowledge that awfully

calls her to Thee? I have then philosophically pursued these reflections till I inferred that those women who have most improved their reason must have the most modesty.—Bashfulness differs essentially from modesty—bashfulness, in fact, is so distinct from modesty, that the most bashful lass, or raw country lout, often become the most impudent; for their bashfulness being merely the instinctive timidity of *ignorance*, custom soon changes it into assurance.

Such is the country-maiden's fright,
 When first a red-coat is in sight;
 Behind the door she hides her face;
 Next time at distance eyes the lace:
 She now can all his terrors stand,
 Nor from his squeeze withdraws her hand.
 She plays familiar in his arms,
 And ev'ry soldier hath his charms;
 From tent to tent she spreads her flame;
 For custom conquers fear and shame.

“ You are, when enlightened,” she adds, “ the Temples of the Holy Spirit, and would you pollute these temples by wicked actions? The more you advance your knowledge, the more will this divine spirit be strengthened in you. As the devout Watts says, the idea respecting the Deity is far more advanced, by his fiat that what he had created were to have

power implanted in their natures to reproduce their kind, than if by a new miracle, he was by his power to create every thing afresh. And, as our great Milton says,

Thoughts may come and go, so unapproved,
As not to leave a stain behind.

Son.—What then are the uses of these central, projecting parts of flowers ?

Father.—The *Pollen* is received upon the *Stigma*, whose moisture retains, and bursts the *Farina* or *Pollen*, and hence its *Aura*, or fine exhalation passes to the seeds in the *Germen* of the *Pistillum*, and renders them fertile.

Son.—What proofs are there of this ?

Father.—A Dissertation by Linnaeus “on the Sexes of Plants,” which, being above the capacity of young people, must be here omitted. We must therefore go on to the consideration of the other parts of the flower.

Son.—What are those beautiful leaves I see here ?

Father.—These the vulgar eye call the flower, but they are only the coverings or protections to the central organs of reproduction.

Son.—What have Botanists called this part ?

Father.—The **COROLLA**.

Son.—What is the derivation of this word ?

Father.—From *Corona*; hence *Corolla*, a

little crown, such as was worn by princes, or at feasts, this part being the crown of the flower.

Son.—Have not some Botanists called this part the *Blossom*?

Father.—Yes, very injudiciously; for we apply in English the word blossom, to the whole of the flower; as when we say, such a plant is in blossom, and in particular we use this appellation for the flower of fruit-trees.

Son.—But the word blossom has a more English sound.

Father.—Granted; but to be understood, it must be defined, and have a new meaning affixed to it different from its usual acceptation; it is, therefore, as well to use a term in general acceptation with all botanists, and by learning at first wrong, we have to learn over again, which is double trouble, and all sciences have their terms, and he that would labour to explain any science, with the abolition of the natural language of such science, is engaged in an useless trouble, and attempts at performing an impossible task.

Son.—I will adopt then the word *corolla*, which I now distinctly comprehend, and I find this corolla composed of many pieces.

Father.—If composed of one piece, we should call this a *monopetalous* corolla.

Son.—You come again to your hard words; please to explain the origin of this term.

Father.—*Μονος*, *monos*, is *one*, and *πεταλον*, *petalon*, is the Greek word for a *leaf*.

Son.—Why not employ the term *one leaf*, which I am told is used in most elementary books for young persons?

Father.—Because the word *leaf* would then be common to what are truly called leaves, and to this part of the flower also: but we often say *one-petalled*, having *one petal* only.

Son.—*Blossom of one leaf* is therefore wrong.

Father.—Certainly.

Son.—What are flowers called which have more than one petal?

Father.—*Polypetalous*, from the Greek words *πολυς*, *polus*, many, and *πεταλον*, *petalon*, a leaf, is when the corolla consists of two or more petals; but we often use these terms:

Di-petalous, of *two petals*;

Tri-petalous, of *three*;

Tetra-petalous, of *four*;

Hexa-petalous, of *six*, and so on.

The Corolla of the white Lily is then *hexapetalous*, composed of *six petals*.

Son.—I observe there are three *outer* and three *inner* petals.

Father.—This is the fact; and the three in-

terior petals have a groove or furrow in each, which occasions a rib externally.

Son.—What is this designed for by Nature?

Father.—That the three outer petals may be closely embraced, or dove-tailed (as it were), to give firmness to the flower in the state of bud.

Son.—What have Botanists chose to denominate this groove or furrow?

Father.—The *nectary*, which is very curious in many plants, as in the *Passion-flower*, *Aconite*, and *Columbine*.

Son.—How do Botanists define this part?

Father.—Whatever is neither calyx, corolla, stamen, or pistillum, is called the **NECTARY**, whether it secretes honey or not.

Son.—Whence is this term derived?

Father.—From the word *nectar*, which means the drink of the gods, as this part usually contains honey.

Son.—Would the word *honey-cup* do as well as the term *nectary*?

Father.—No, as this part seldom resembles a cup, and from the definition before, this part is not always the honey cup.

Son.—Have all flowers a *corolla*?

Father.—No, for this part is sometimes found wanting, as in our *Hippuris*, *Mare's-tail*.

Son.—What are the uses of this part of the flower?

Father.—For *protection* of the central organs of reproduction, and to act as a *parasol* or *parapluis*.

Son.—What do you mean by this?

Father.—Many flowers expand their corollas to the sun, and close them in the evening, or before rain; others again close them at certain hours; and hence the botanical clock and weather-glass.

Son.—Will you explain this?

Father.—This will be better known to you as you advance in the science; but as you so much wish it, I shall give you an account of the Botanical Horologe.

Linnaeus divides flowers into, 1st. *Meteoric* flowers, which less accurately observe the hour of unfolding, but are expanded sooner or later, according to the cloudiness, moisture, or pressure of the atmosphere. 2d. *Tropical* flowers, which open in the morning and close before evening every day; but the hour of the expanding becomes earlier or later, as the length of the day increases or decreases. 3dly. *Equinoctial* flowers, which open at a certain and exact hour of the day, and for the most part close at another determinate hour.

Hence the Horologe, or Watch of Flora, is

formed from numerous plants, of which the following are those most common in this country. *Leontodon taraxacum*, Dandelion, opens at 5—6, shuts at 8—9. *Hieracium pilosella*, mouse-ear Hawk-weed, opens at 8, shuts at 2. *Sonchus lævis*, smooth Sow-thistle, at 5 and at 11—12. *Lactuca sativa*, cultivated Lettuce, at 7 and at 10. *Tragopogon luteum*, yellow Goatsbeard, at 3—5 and at 9—10. *Lapsana*, Nipplewort, at 5—6 and at 10—1. *Nymphaea alba*, white Water-lily, at 7 and 5. *Papaver nudicaule*, naked Poppy, at 5 and at 7. *Hemerocallis fulva*, tawny Day-lily, at 5 and at 7—8. *Convolvulus*, at 5—6. *Malva*, Mallow, at 9—10 and at 1. *Arenaria purpurea*, purple Sandwort, at 9—10 and at 2—3. *Anagallis*, Pimpernel, at 7—8. *Portulaca hortensis*, garden Purslain, at 9—10 and at 11—12. *Dianthus prolifer*, proliferous Pink, at 8 and at 1. *Cichorium*, Succory, at 4—5. *Hypochaeris*, at 6—7 and at 4—5. *Crepis*, at 4—5 and at 10—11. *Picris*, at 4—5 and at 12. *Calendula field*, at 9 and at 3. *Calendula African*, at 7 and at 3—4.

But this clock work ceases when the seeds become impregnated; the calyx and petals of the corolla then no longer close, wither and drop; the stamens also perish; the pistillum withers; all perish but the germen, which becomes enlarged, when it is called now a Pericarp.

Son.—I have heard you mention the word CALYX, as belonging to some plants; what does that term mean?

Father.—The *calyx* is the outer covering of a flower, usually of a green colour, as in the Moss Rose and Carnation, and best seen in the state of bud. All flowers have not a calyx, several being without this protection,—as the Lilies, and in the Poppy, it is *caducous*.

Son.—Please to explain this last term.

Father.—In the early stage, this flower elegantly droops, but soon its two calyx leaves drop, and the corolla assumes an upright position. Often, however, this part is *permanent*, and assumes the office of a pericarp, or seed-vesseï, as in the White Nettle, *Lamium*.

Son.—This part is frequently called the *cup*, and *flower-cup*, or *empulement*, in elementary books: are these terms as good, or better than the word *calyx*?

Father.—This part having no resemblance to a cup, and requiring a definition, hence the propriety of adhering to the scientific term *calyx*, which is derived from the Greek word $\kappa\alpha\lambda\upsilon\pi\tau\omega$, *kalupto*, to *conceal*, or *cover*, being the protection of the flower in the state of bud.

Son.—How is this part formed?

Father.—It is composed of one or more leaves.

Son.—Why is the term *leaf* used now ?

Father.—Adopting the term *petal* exclusively to the corolla, the term *leaf* may be used here ; but the word *phyllous* is oftener employed from the Greek word *φυλλον*, *phullon*, a *leaf* ; thus we say—

Mono-phyllous	. . .	One-leaved,
Di-phyllous	. . .	Two-leaved,
Tri-phyllous	. . .	Three-leaved,
Tetra-phyllous	. . .	Four-leaved,
Pente-phyllous	. . .	Five-leaved,
Hexa-phyllous	. . .	Six-leaved,

and so on to

Poly-phyllous . . . *Many-leaved.*

Son.—Are there any other terms used further to express these parts ?

Father.—Yes ; these Expansions may be cut into *teeth*, when we say they are *dentate*, from *dens*, a *tooth* : if cut into two small parts, we then use the word *bifid*, or *two-cleft*—*trifid*, or *three-cleft* :—if cut beyond the middle, the word *parted* is used as *bipartite*, *two-parted*—*tripartite*, *three-parted*, and so on. These divided parts are called *segments* (*laciniæ* ;) and if this be cut into other segments, these are called *lacinules* (*lacinula*), cuttings of segments : and if these are broad, we use the word *lobed*,—as *two-lobed*, *three-lobed*, and so on.

Son.—What is called the PERICARP ?

Father.—This is the germen enlarged, containing the seeds advanced to maturity.

Son.—What is that part upon which all the other parts are seated ?

Father.—This is called the RECEPTACLE.

RECAPITULATION.

FLOWERS, although apparently so diversified, consist but of seven parts.

I. The PISTIL (*Pistillum*), in the centre of the flower.

II. The STAMEN (*Stamen*), exterior to this. Both these are *projecting* bodies, being *extensions* (according to LINNÆUS), the *first*, of the *pith*; and the *second*, of the *wood*.

The PISTIL is discriminated by a *swollen base*, which is the seed vessel, or GERMEN, which being opened discloses the seeds.

The STAMEN is discriminated by having a *part* which *forms* and *contains* coloured FARINA, or POLLEN, which is called an ANTHIER by Botanists.

A *perfect* or *complete* PISTIL is composed of three parts:—

1. The STIGMA (*Stigma*), at top, never absent, though sometimes obscure.

2. The STYLE (*Stylus*), elevates the Stigma, not absolutely essential.

3. The GERMEN (*Germen*), or seed-vessel, always present.

An *imperfect* PISTIL has no STYLE.

A *perfect* or *complete* STAMEN is composed of two parts:—

1. The ANTHÉR (*Anthera*), at top, containing the fertilizing pollen, always present.
2. The FILAMENT (*Filamentum*), elevating the anther, not so essential, being absent in some flowers.

An *imperfect* STAMEN has no *filament*.

When the STAMENS and PISTILS are found together, the flower is then called BISEXUAL.

When these are separate, being placed in different flowers, the flower is then called UNISEXUAL.

For the protection and nourishment of the CENTRAL ORGANS of vegetables (*viz.* the PISTILLA and STAMINA), Nature has usually furnished two other *parts*.

III. The COROLLA (*Corolla*), interior.

IV. The CALYX (*Calyx*), exterior to this part.

Both *expanded bodies*, being expansions, the *one* of the *bark*, and the *other* of the *rind*.

These are discriminated not only by their *respective situations*, but by the *greater delicacy* of the COROLLA compared with the CALYX,

the former having usually *coloured* PETALS, the latter *green* LEAVES.

These parts are not absolutely essential, some flowers being destitute of one or both of them. As an appendage to the corolla, is

The NECTARY (*Nectarium*), a part for the secreting and containing of honey.

VI. The PERICARP (*Pericarpium*), which is only the *germen enlarged*, filled with *mature seeds*.

VII. The SEEDS (*Semina*), the *rudiments* of the *new plant*; and lastly,

VIII. The RECEPTACLE (*Receptaculum*), the *basis* upon which *all the other parts rest*.

Son.—Do people observe this plan in their descriptions of plants?

Father.—You will find this regular order observed by all Botanists, thus:

I. CALYX described, as to kind, leaves, &c.

II. COROLLA described, as to petals.

(NECTARY comes under this head.)

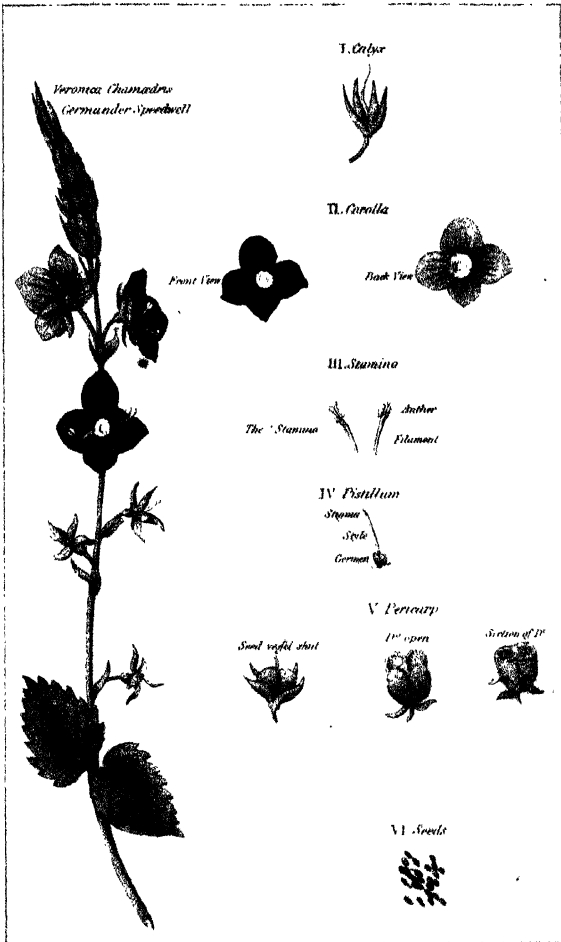
III. STAMINA described, first as to the *filaments*, and then the *anthers*.

IV. PISTILLUM described, as to *germen*, *style*, and *stigma*.

V. PERICARPIUM described.

VI. SEMINA described.

VII. RECEPTACULUM, usually omitted.



Henderson del.

W. J. Wood engr.

Quarter of the Spreehwell.

SECOND CONVERSATION.

ON THE DIFFERENT KINDS OF CALYXES.

Son.—DEAR Father, I think I am a Botanist already; I have been hunting the garden all over, and making observations, and I find my mind expands with new ideas. I understand now that part which has the moss about the Rose, which especially appears when in a state of bud, is called the *calyx*, and the outer green part in the Carnation is the *calyx* also, which has *scales* at the bottom. I am advanced so far as to find that both these are *monophyllous*, that is composed of one leaf; that the Rose is cut into five *laciniæ*, or segments, two of which are fringed on one side only, two not fringed, and one fringed on both sides; but that the calyx of the Carnation is *five-toothed*, that is, cut into five teeth. Vide page 18.

Father.—Quite right; have you made any more observations?

Son.—Yes, Father, the leaves of the Artichoke I see now are calyx-leaves; and I recollect well the calyx which surrounds the Filbert, which has so sharp an acid taste when

bit; but I fear there are some calyxes' yet which I do not understand.

Father.—You must not, my dear son, think yourself a Botanist yet. Do you not know there are several kinds of dogs and other animals?

Son.—Yes, Father, I do; as the Greyhound, Spaniel, Bull-dog, Pug-dog, Newfoundland dog, Terrier, &c.

Father.—Yes; and there are different kinds of Apples.

Son.—I remember them very well; as the Golden Pippin, Nonpareil, Russitan, &c.

Father.—So of buildings.

Son.—Yes, there are several, as Palaces, Houses like ours, Cottages, and Churches.

Father.—The word dog then is a generic word, including several kinds or species under the same genus: so the word apple is common to all the sorts; and the same of the word building.

Son.—How does this apply to Botany?

Father.—The word *calyx* is also a generic word, including several different species.

Son.—How many different sorts of calyxes have Botanists enumerated?

Father.—There are SEVEN sorts, or kinds of calyxes, which Botanists have defined, and given to them particular names.

Son.—I see then I am not yet a Botanist, but wish much to advance in the science.

Father.—There are then seven sorts of Calyxes.

Son.—How are these called?

- Father.*—1. A Perianth, *Perianthium*.
 2. An Involucre, *Involucrum*.
 3. A Spathe, *Spatha*.
 4. A Glume, *Gluma*.
 5. An Ament, *Amentum*.
 6. A Calyptra, *Calyptra*.
 7. A Volve, *Volva*.

Son. How are these distinguished?

Father.—The PERIANTH, is the outer covering, placed close to the Corolla.

Son.—Whence is this word derived?

Father.—From *περι*, *peri*, around, and *ανθος*, *Anthos*, the flower, as being that part, which immediately surrounds the Corolla.

Son.—Is this sort of Calyx frequently met with?

Father.—It is the most common sort of Calyx, the greater number of flowers possessing it.

Son.—Why not use the definition instead of the word, and then Botany would be free from hard words.

Father.—This would be multiplying words indeed, and no books would be large enough to

contain the descriptions of plants. How poor would be our language, if instead of Terrier, and Bull-dog, I was to be obliged to define all these sorts of dogs, instead of using their names.

Son.—I see then the propriety of Botanical terms, which express in one word, the ideas, which when defined would require a line or more.

Father.—In all proper Botanical Books you will find these terms used.

Son.—I remember reading,—CALYX, a Perianth, in such books which I now understand ; but could it not have an English term to express it ?

Father.—Yes ; but see how ridiculous is this attempt, which nevertheless, is persisted in by some. Thus, 1. “ the *Flower-cup*, outer covering of the flower, is a *Flower-cup*, properly so called ;” meaning “ *Calyx*, a *Perianth*,” for all these English words, have themselves to be defined, and then by using a different language, the true language of Botany has also to be learnt, and it is, therefore, as well to learn the right language at first, which is universal amongst all Botanists in every country. Would you have the words Astronomy, Geography, &c. put aside, because they are of Greek origin, and English definitions substituted in their place ?

Son.—By no means.

Father.—Why not then adopt into our language Botanical words of Greek or Latin origin? They will become familiar by use.

Son.—I see this, and now acknowledge as much propriety in adopting the term *Perianth*, as the words *Astronomy*, *Geography*, and *Geranium*.

Father.—Let us proceed on to the second kind of calyx, the *INVOLUCRE*.

Son.—How does this differ from the other kind?

Father.—An *involucre*, is a calyx at some distance from the *Corolla*.

Son.—Whence is this term derived.

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

Son.—How does this apply, when such a calyx is remote from the flower.

Father.—Because in the first instance, this species of calyx does actually involve the flower, or bundle of flowers.

Son.—I do not quite understand this.

Father.—For example, in the *Anemone*, there are green leaves, or rather one leaf cut into many divisions, which at first enclose the corolla, when the flower droops. After a time, the flower is disengaged of its swaddling-

clothes, and becomes erect upon its flower-stalks, when at an inch or more the same calyx takes its position at a distance from the flower round the stem of the plant.

Son.—Give me another instance.

Father.—In the Passion flower, there are three leaves, which are the tenth of an inch remote from the Perianth, and are hence called leaves of the involucre.

Son.—I should have called this a double calyx.

Father.—So it is in fact. But the inner Calyx alone is the true Perianth of the flower, the other is called the involucre.

Son.—I wish you would explain this by more examples.

Father.—Do you recollect the common Cow-slip.

Son.—Oh yes! But I know nothing about it scientifically.

Father.—The flower is *umbelliferous*.

Son.—You come upon me again with more hard words; what do you mean by an umbelliferous flower.

Father.—It is derived from the Latin word *umbella*, a little shade, and *fero*, to bear, for it spreads out like a shade. *Umbra* means shade.

Son.—Like our umbrellas, I conjecture.

Father.—You are right here, for that word, now in common use has the same derivation.

Son.—The flowers I remember are not much unlike an umbrella.

Father.—Right: the flower stalks are called peduncles, from *pes*, a Latin word, a foot, or support, for the flowers are elevated, or supported upon these.

Son.—I now understand the word peduncle.

Father.—An umbelliferous flower, is one where all the peduncles issue from one common centre, like the radii of a circle.

Son.—Like the spokes of a wheel issuing from its nave.

Father.—Yes; and very often upon each peduncle is fixed the flower itself.

Son.—I see it is so in the Cowslip, where all the peduncles terminate in a flower.

Father.—When this is the case Botanists call this a GENERAL OR UNIVERSAL UMBEL.

Son.—This I understand.

Father.—Do you not observe some small leaves placed about the origin of these peduncles, or flower-stalks?

Son.—Yes, I do; and should be quite at a loss what to call them.

Father.—Botanists have chosen to call these little leaves, remote from the flower, the CALYX, an *involucre*, and as situate at the foot or centre of the general umbel, a general *Involucre*.

Son.—The Cowslip to describe it has then two kinds of calyxes.

Father.—Yes, “CALYX, a *Perianth* ;” each flower possessing this first kind of calyx, and a common calyx, “a *general Involucre*,” situated at the origin of the general umbel.

Son.—How is it with our Geranium ?

Father.—This is exactly the same ; you see the flowers first drooping covered with scale-like leaves, which become the *involucre* of the general umbel.

Son.—The peduncles afterwards grow longer, I remember that upon each is situated the flower.

Father.—But when these umbrella sticks, or peduncles, do not terminate in a flower, they become the centre, upon which other smaller peduncles arise, as from a common centre, and upon these small sticks are fixed the flowers. This smaller umbel is called the *partial* umbel, in contradistinction to the *general* umbel.

Son.—This I understand.

Father.—If small leaves are placed at this second centre, or in other words at the foot of

the *partial* umbel, these calyx leaves are called the *partial* involucre.

Son.—Please to give me an example of this.

Father.—As in the Fool's Parsley, (*Æthusa Cynapium*) which has three longish leaves at the foot of each *partial* umbel, distinguishing this poisonous plant from the common Parsley, which it much otherwise resembles.

Son.—I think I understand now the *general* and *partial* umbel, and the *general* and *partial* involucre.

Father.—We will then proceed on to the *third* species of calyx, the SPATHE.

Son.—How is this defined ?

Father.—It is a calyx which opens on the side.

Son.—What is the derivation of the word ?

Father.—From *spatha*, a Latin word, meaning a sheath or scabbard, which this part somewhat resembles.

Son.—Give me an example of this.

Father.—Our common Cuckoo-pint, also called Lords and Ladies, the ARUM MACULATUM of the hedge-banks, is an example of the spathe ; also the Narcissus, (*Narcissus Poeticus*) and Snowdrop, (*Galanthus Nivalis*.)

Son.—What is the fourth species of calyx, the GLUME ?

Father.—This is the husk of the natural tribe of grasses, enclosing one or more little flowers, or florets.

Son.—Whence is this word derived?

Father.—From *gluma*, a Latin word, meaning chaff.

Son.—What is the peculiar nature of Grasses?

Father.—They are resembled by Linnæus to the common people, the more they are trampled on, the more they increase.

Son.—What is the *fifth* species of calyx, the *ament*?

Father.—An ament consists of small chaffy scales, dividing each floret upon a thong-like receptacle.

Son.—Whence is that word derived?

Father.—From the Greek word *αμμα*, *amma*, a whip, or thong.

Son.—Is it not vulgarly called a *catkin*?

Father.—Yes, from its resembling the tail of a cat; also *gulls**, from the Greek *γυλος*, *gulos*, down, this having often the appearance of down.

Son.—Ought we to adopt these English terms?

* Young goslings are called *gulls*, from being covered with down.

Father.—There can be no advantage gained, as in either case they would require to be defined.

Son.—I would thank you for some examples of this kind of calyx.

Father.—It is singularly curious, that this sort of calyx mostly occurs in flowers which are male and female, sometimes placed on the same plants, sometimes on distinct plants of the same genus, and more especially in trees or shrubs. In the Horn-beam, (*Carpinus*) the ament supports both male and female flowers on the same tree. In the Willow, (*Salix dioica*) on different trees. In the Hazel-nut, (*Corylus*) where the male and female flowers are on the same tree, the male flowers have an ament for the calyx, whereas the female flowers are in a perianth. So of the Walnut, (*Juglans*). Nature has also wisely ordained that in these, the flowers shall appear before the leaves, that the farina from the male-flowers may be carried more securely by the winds to the pistillas of the female flowers.

Son.—Could we not call these *stameniferous* and *pistiliferous flowers*, instead of saying that plants are male and female?

Father.—We feel no hesitation in using terms denoting the difference of the sexes as regards the animal creation; and we cannot

fail to notice it in the more beautiful forms of birds, the cock birds only singing, and the hens chirping; and we trace this difference throughout Nature. We talk of the parental affection of the Hen. It is only being little accustomed to speak of flowers being male and female, which has created a doubt as to the propriety of employing such terms.

Son.—Please to define what Botanists call the *sixth* species of calyx, which belongs to the moss.

Father.—It is named *calyptra*, from καλυπτω, to cover, being to the moss a veil or covering, and it resembles in figure an extinguisher, or monk's cowl.

Son.—What is the peculiar property of mosses?

Father.—Although preserved for many years, even an hundred, and perfectly dry, if wetted, they will immediately resume their original verdure.

Son.—What is the *seventh* kind of calyx, that of Mushrooms, (*Trungi?*)

Father.—It is called *volve*, from *volvere*, to roll round, being the covering of several sorts of mushrooms, which enfolds the gills, (*laminæ*) and bursts from the edges of the hat, (*pileus*), and afterwards rolls round the pedestal like a fringe.

Son.—How is the Edible Mushroom distinguished?

Father.—By its volve, which forms its appearance like a button, at first, and is afterwards seen as a fringe, the gills looking salmon-coloured at first, afterwards black.

Son.—Have Toad-stools this appearance?

Father.—No; they have no calyx, therefore their gills are visible, even when in the form of buttons, and their stems are devoid of this frill, or volve.

You need no longer dread eating the mushroom, knowing now the distinction.

RECAPITULATION.

HAVING formed a general idea of a Flower, formed of, I. CALYX; II. COROLLA and NECTARY; III. STAMINA; IV. PISTILLA; V. PERICARP; and VI. SEEDS; and VII. RECEPTACLE, we should next consider each of these parts in a more particular manner, for

The term CALYX, like our words, horse, bird, dog, habitation, is a generic word, including several distinct species, thus:

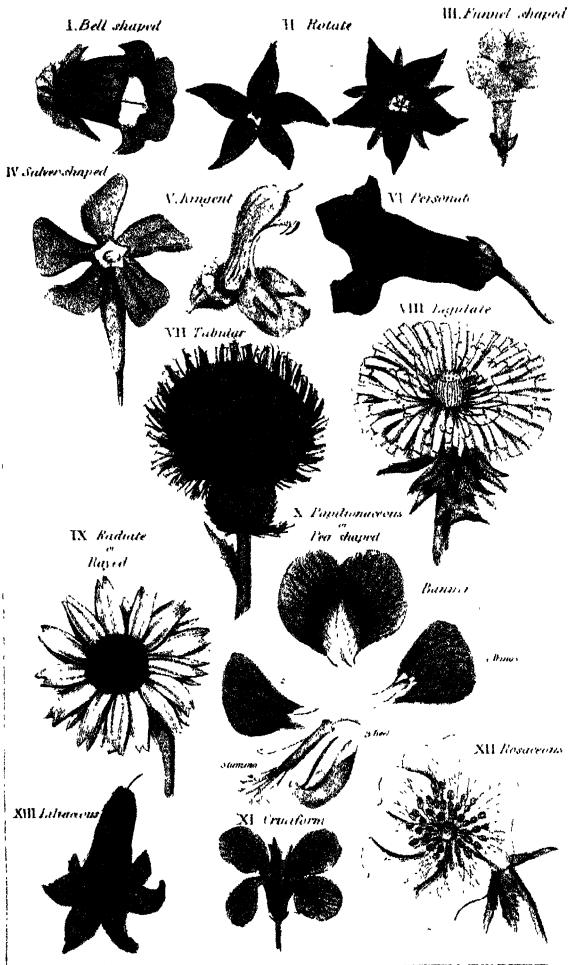
I. PERIANTH (*Perianthium*) is the most common kind of calyx, usually green, sometimes coloured, and placed contiguous to the corolla.

II. INVOLUCRE (*Involucrum*) is a calyx re-

mote from the flower, most commonly stationed at the foot of a general or partial umbel.

- III. SPATHE (*Spatha*), a species of calyx, which first involves the infant flowers like a sheath, and then opens longitudinally.
- IV. GLUME (*Gluma*), the outer valves, or husks of corn, or grass, enclosing one or more florets.
- V. AMENT (*Amentum*), small chaffy scales, protecting the florets placed on a thread-like common receptacle.
- VI. CALYPTRA (*Calyptra*), the covering of a moss, placed over it, like a cap or bonnet.
- VII. VOLVA (*Volva*), a membrane, which involves the fungus in its infant state, and which afterwards appears in a lacerated form on the foot stalk*.

* Of the 1021 genera of plants, known in the time of Dr. Alston, Professor of Botany at Edinburgh, he observes, 673 had a PERIANTH; 75, an INVOLUCRE; 72, a SPATHA; 29, a GLUME; 18, an AMENT; 3, a CALYPTRA; 2, a VOLVA; and 110, no Calyx of any kind.



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Differents Corollas

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THIRD CONVERSATION

ON THE DIFFERENT KINDS OF COROLLA.



Son.—UPON looking abroad into Nature, the variety of flowers is such, that they appear to me impossible to be classed.

Father.—The vulgar eye observes, indeed, a beautiful confusion; whereas the scientific Botanist sees order, regularity and contrivance, where the uninformed spectator beholds but the splendor of colour; and he finds, that however diversified the appearances of flowers, they can be easily classed into THIRTEEN different kinds.

Son.—Whence is the derivation of the term *corolla*?

Father.—As said before, from *corona*, a *crown*: *corolla* means a *coronet*, or little crown.

Son.—How is this part explained?

Father.—This conspicuous part of the flower is defined by *Linnaeus* to be the expansion or continuation of the fine inner bark of the plant, and consists of two parts, the *petal* and *nectary*; the last of which, however, is rather a striking superfluity, or occasional appendage,

than a necessary part of every flower. The *petals*, says Tournefort, are those painted leaves which generally excel the other parts of the plants in beauty and colour, and never, like the calyx, becomes a cover to the seeds.

Son.—Are there any other distinctive marks ?

Father.—The green leaves of plants, as well as the calyx leaves, give out pure or oxygen air; whereas the beautiful petals of the corolla, as well as fruits, give out azot; so that the one purifies the air, whereas the other corrupts or injures it.

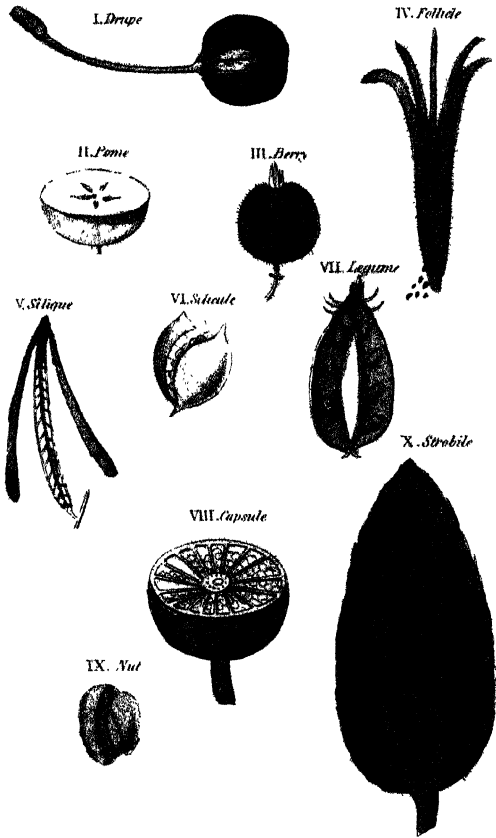
Son. What are the names of the thirteen different sorts of corollas ?

Father.—I. *Bell-shaped*; II. *Wheel shaped*; III. *Funnel-shaped*; IV. *Salver-shaped*; V. *Ringent*; VI. *Personate*; VII. *Tubular*; VIII. *Ligulate*; IX. *Radiate*; X. *Cruciform*; XII. *Rosaceous*; XIII. *Liliaceous*.

Son.—What are the characters of the first sort of corolla, as the *Bell-shaped* ?

Father.—I. A *bell-shaped corolla* (corolla campanulata, from campana, Latin, a bell) has a single petal, shaped like an inverted bell, without a tube for its base. It is generally of the same width throughout; but when it bulges out on the side, it is then more properly called *globular* or *globose*, as resembling a globe.

Son.—What is the striking character of it ?



Father.—An hollow corolla, having *no tube* at its base, an example of which is in the *Campanula*, Bell-flower, and the *Andromeda*.

Son.—What is the second kind of corolla?

Father.—A *wheel-shaped*, or *rotate corolla* (corolla rotata, from rota, a wheel) is when the border is either hollow or flat, and seated upon a *very small tube*, like the nave of a wheel.

Son.—I suppose you mean when the wheel is on the ground; whence its name?

Father.—Yes.

Son.—What do you mean by *border*?

Father.—The flat expanded part above the tube.

Son.—Favor me with some examples.

Father.—As the *Kalmia* and *Veronicas*.

Son.—What are the characters of the **THIRD** kind of corolla?

Father.—The *funnel-shaped corolla* (corolla infundibuliformis, from infundibulum, a funnel) is when the border is *hollow*, like a funnel, and seated upon a *long tube*, as the *Tobacco* and *Cowslip*.

Son.—How does this differ from the rotate, or wheel-shaped corolla?

Father.—By the greater length of its tube. The bell-shaped, you know, is without any tube.

Son.—What is the fourth kind of corolla?

Father.—The *salver-shaped* corolla (*hypocra-teriformis*, from *υπο*, *upo*, under, and *κρατηρ*, *krater*, a salver), has a *flat* spreading limb, situated upon a long tube, as the *Periwinkle* and *Primrose*.

Son.—How does this differ from the funnel-shape?

Father.—From the border being flat, like a salver; and this particularly distinguished the *Primrose* from the *Cowslip*.

Son.—What is the *Oxlip*?

Father.—The common *Cowslip* has a general umbel, each peduncle terminating in a flower. When the flowers are funnel-shaped, it is then the *Cowslip*; and when, on the contrary, the flowers are salver-shaped, it is then the *Oxlip*.

Son.—How does the *Oxlip* differ from the *Primrose*?

Father.—The *Primrose* has a single flower, is seated on a radical peduncle, that is a flower-stalk issuing from the root, and the flowers do not form an umbel. The *Oxlip* is a *Primrose* flower on the stalks of a *Cowslip*.

Son.—I see now the utility of scientific distinctions.

Father.—All these four sorts of corollas have an horizontal direction. We proceed now to two other sorts, which open on the sides like lips.

Son.—What are these called ?

Father.—*Labiata*, or lipped flowers.

Son.—How do these divide ?

Father.—V. Into *Ringent*, and VI. *Personate* corollas.

Son.—What is the definition of a *ringent* corolla ?

Father.—A corolla of one petal, tubular at bottom, but whose border opens on one side into two lips: if these lips be open, it is called then the 5th species of corolla, the *ringent* corolla.

Son.—What is the derivation of this word ?

Father.—From the Latin word *ringere*, to gape; as it much resembles the mouth gaping.

Son.—How does this differ from the *personate* corolla ?

Father.—From the different opening of the lips, in the *ringent* corolla the stamens are visible; in the *personate*, they are concealed.

Son.—Is there any other distinction ?

Father.—The *ringent* flowers have four naked seeds in the bottom of the calyx, which this part afterwards protects, serving the office of a pericarp.

Son.—The *personate* have their seeds covered by a pericarp, or seed-vessel.

Father.—Yes.

Son.—Have these lips any other names than upper and under ?

Father.—Yes; the upper lip, being concave, is usually called the *crest*, or *helmit* (galium), which is often entire, and sometimes more or less cut into two segments: the lowermost, termed the *beard* (barba) is cut usually into three.

Son—In the White or Dead Nettle (lamium album) and the Red, (lamium purpureum) I have observed two little projections betwixt the lower lip and the throat, or gape, (hiatus) what are these called?

Father.—These are called teeth, and prove the red nettle to be of the same genus as the white, and some other lamiums.

Son.—Are not these truly Nettles?

Father.—No, the true Nettle, which stings, is the Urtica, which in nothing resembles the Lamium, but in the wrinkled form of its leaf.

Son.—I see then the Lamium Album, the Dead Nettle, is no nettle at all, and I feel more and more the utility of science.

Father.—The *personate* corolla has likewise a tube, and two lips, but these are closed, so as to resemble the snout of an animal; hence called *personate*, from *persona*, a mask.

Son.—Give me an example of a *personate* corolla.

Father.—The Snap-dragon, Antirrhinum Major.

Son.—I remember pulling open this flower by the lips, and it had an horrid look, like the throat of a dragon; and I let the lips go, when they closed with a snap.

Father.—Hence the origin of the name.

Son.—In what do they resemble each other?

Father.—In having four stamina, two long and two short. The anthers are mostly twin.

Son.—I remember this in the Ground-ivy: they much resemble a St. Andrew's cross; and the twin anthers are very conspicuous in the Fox-glove.

Son.—Is the Fox-glove, *Digitalis*, a ringent, or personate corolla?

Father.—Well asked; for it appears a link connecting the two tribes together, as having the stamens visible, it should come under the class of ringent corollas; but as having the seeds in a capsule, it is more properly a personate flower.

Son.—These form a natural order of flowers.

Father.—That is well said.

Son.—All these are monopetalous?

Father.—Yes, they are the monopetalous corollas of *simple* flowers.

Son.—What do you mean by *simple* flowers?

Father.—Such as are not *compound*.

Son.—How do you discriminate *compound* from *simple* flowers?

Father.—A *compound flower* is one which is compounded or made up of several florets; so that if one of these be removed, the symmetry or beauty of the whole is destroyed.

Son.—Is that a sufficient definition?

Father.—By no means: but we must look at the anthers, and in the compound flowers we shall find five of these united in one body, surrounding the pistillum, which passes through this column, and has its stigma above these anthers bifid, or two-cleft, and revolute, or rolled back on each side.

Son.—Will you favor me with a further explanation of this subject?

Father.—These flowers have a calyx, common to the whole body of florets.

Son.—Is there any other particulars worthy of observation?

Father.—Here the receptacle is very conspicuous, upon which all these little florets are seated.

Son.—I remember this part well in the Dandelion, and now see the utility of placing the receptacle as one of the VII parts of flowers.

Father.—The florets also are all sessile, that is immediately seated upon this receptacle. The seeds are naked, (without a capsule) and placed upon it like a set of nine-pins.

Son.—This I recollect to have remarked in the Dandelion, which I have often blown about as a boy.

Father.—You must now contemplate it as a man, not as a child; and you will observe that the seeds are crowned with a *pappus*, which serves it as wings, so that the seeds look like so many shuttlecocks in the air.

Son.—How many kinds of compound flowers are there?

Father.—Three; I. the *Tubular*; II. *Ligulate*; and III. the *Radiate*.

Son.—Have all these their anthers united into one body?

Father.—Yes; and hence they come under the class XIX. Syngenesia of Linnaeus, from the Greek *σύν*, *sun*, together, and *γενεσις*, *genesis*, birth.

Son.—How are the *tubular* florets known?

Father.—By having small florets, of one petal, tubular or funnel-shaped, the margin of which is cut into five teeth.

Son.—Is not the Artichoke of this nature?

Father.—Yes; the *common calyx* has leaves placed against each other like the tiles of an house. The receptacle is the *bottom*, and the *choke* are the young flowers, and which terminate in a bitter part, which are the young seeds attached to the receptacle.

Son.—The flowers, I recollect, are a fine azure blue, and five-cleft, exactly as you have described it; and the five anthers are black, surrounding the pistil.

Father.—This is then an example of a tubular compound corolla.

Son.—What is a *ligulate* corolla?

Father.—This is derived from the word *ligula*, a strap, from its most frequently resembling the strap of a shoe, being *linear*.

Son.—What is the meaning of the word *linear*?

Father.—Botanists define all their words; and *linear* means when the marginal lines run parallel, that is, are of equal width throughout.

Son.—What is an example of this kind of corolla?

Father.—You have the familiar example of the Dandelion.

Son.—What is the derivation of this word?

Father.—In Greek it is *λεοντοδου*, *leontodon*, lion's-tooth: *odon*, Greek, means a tooth, from the jagged edges of the leaves, being like teeth of that animal.

The Romans call it *dens leonis*, from the Greek. The French, from the Latin, *Dens de leon*; and we from the French, *Dan-de-lion*.

When growing in lanes you may observe it nestle to the ground; but in rich soils, it rises

on a noble scape, and the flowers are all ligulate, of different sizes, but all constructed alike, with a flat surface, resembling a burning sun; but when the seeds are fertilized with the pollen of the stamens, the calyx-leaves become reflexed, and all the seeds beautifully range in order on the receptacle, and form a beautiful ball. Each seed has a *stipe*, which means a thread, upon which is fixed the feathery *pappus* which gives the *tout ensemble*, which much resembles a shuttle-cock.

Son.—Yes! I have often blown it to see the beautiful manner the seeds flew about, dispersing in every quarter. I understand now the *ligulate corolla*.

Father.—We will proceed then to the *radiate*, or *compound radiate*.

Son.—How is this defined?

Father.—As composed of two sorts of florets, the *tubular* and *ligulate*:

Son.—How are these placed?

Father.—The *tubular* florets occupy the centre, and this part is called the disk, (*discus*) a term used to denote the body of the sun itself, which it much resembles.

The *ligulate* florets occupy the circumference, or, to speak botanically the ray, (*radius*) a term used to express the glory surrounding the sun, which this part also much resembles.

Son.—What is the meaning of the word radiate?

Father.—A flower rayed (radiata) is one having florets in the circumference like rays.

Son.—Favor me with an example.

Father.—The Sun-flower, (*Helianthus Major*) is a familiar example, called so from its resembling the sun in all its glory, not from following the sun in its course, as usually supposed; and the *Aster*, is so called from its appearance in lesser glory, like a star; and the *Daisy*, (*Bellis Perennis*) is so called from the florets in the ray closing in the evening, but expanding with the morning, hence called the Day's-eye; and *Marygold*, (*Calendula*) which blows a great while, appearing nearly throughout the calendar, and the English name after the blessed Virgin, and from its golden colour.

Son.—I begin to take delight in scientific Botany, which makes me observe things with different eyes than I did before, and I should like to know more about these flowers.

Father.—Your inquiry will be repaid, for the Almighty has hid the mysteries of his creation from inattentive eyes, "eyes have they, but see not, ears have they, but hear not," and I will try to gratify this laudable curiosity of yours.

Son.—I thank you, father.

Father.—In the *Sun-flower*, the tubular florets in the disk, or centre of the flower, as possessing a pistillum, surrounded by the associated anthers, produce perfect seeds, which are placed in an honey-comb-like receptacle. But the rayed-florets, which have so noble an appearance are barren; that is, produce no seeds, which are only found in the disk. But the reverse of this happens in the *Calendula*, *Marygold*; where the florets in the disk are unproductive, from a defect in the pistillum; whereas those in the circumference, or ray, only produce seeds, which you will please to examine. In the *Aster* and *Daisy*, the tubular flowers have perfect seeds in the centre; and the pistilliferous florets in the circumference, for these ligulate florets have only pistils, being perfect, also produce seeds.

Son.—Why is this difference?

Father.—These are the innocent sportings of Nature in the vegetable world.

Son.—I should wish explained the common *Blue-bottle*, (*Centaurea*) in corn fields.

Father.—This is another sporting of Nature, for it has tubular florets in the centre, productive, and different from all other flowers of this natural tribe, has also tubular florets in the circumference.

Son.—Surely these tubular florets in the ray, which are so large and conspicuous, produce seed?

Father.—No; if you examine them, there is no sign either of stamens or pistillum, only a bare petal of the corolla.

Son.—Has Linnæus availed himself of these observations in his system?

Father.—Yes, he has, as we shall afterwards explain.

Son.—Are these then all the kinds of monopetalous flowers?

Father.—I am glad you remember this distinction; all monopetalous flowers may be referred to one or other of these *nine* species.

Son.—We come now to the *polypetalous* corollas.

Father.—More than one petal do you call a polypetalous corolla?

Son.—I do; but should have supposed, from the derivation of the word *πολυς*, *polus*, many, and *πιταλον*, *petalon*, a leaf, that it meant a great many petals.

Father.—So it does, indeed; but in the accurate language of Botany, it means two or more petals.

Son.—I see, then, the necessity of learning Botany as a science. Of the section polypeta-

lous corollas, the first is the *cruciform*, the tenth species; what does that mean?

Father.—It is a tetrapetalous corolla.

Son.—What does that mean?

Father.—It is a word derived from *τετρα*, tetra, four and *πεταλον*, petalon, a petal, as consisting of four petals.

Son.—So far I understand.

Father.—And these petals are all regular, that is, of the same shape and size.

Son.—This I also understand.

Father.—And they are placed opposite each other, like a St. Andrew's Cross, X; hence the term *cruciform*, from *crux*, *crucis*, Gen. Latin, a cross, and *forma*, like, shape.

Son.—I see the petal bends at right angles, and the broad part is flat, and shaped like the broad part of a battledore, and the narrow part resembles the handle.

Father.—This broad part is called the *border* (*lamina*); and the narrow part, which goes into the calyx cup, is the *claw* (*unguis*).

Son.—Are the cruciform flowers distinguished by any other marks.

Father.—By having four long stamens, forming a square; and two, short, on the sides, thus . . .

Son.—Does not the pericarp, or seed-vessel, also differ?

Father.—Yes, the shells called valves roll back, and shew a central part on each side, to which the seeds are alternately attached. These are called a silicle, and silique.

Son.—These, I suppose, you will further explain, when you come to discourse on the seed-vessels?

Father.—The silicle and silique will be then clearly defined. Vide p. 66.

Son.—The Cruciform are a natural tribe of plants?

Father.—Most certainly.

Son.—Please to favor me with an example.

Father.—The common Stock (*Cheiranthus*), is a familiar example; and the small stamens have their filaments curled, in order to give room to two glands, called the nectary, here very conspicuous.

Son.—Is the Wall-flower the same?

Father.—This should not be selected as an example, as the two short stamens soon acquire the length of the other four.

Son.—What is that flower I see?

Father.—It is called Honesty, also Moonwort.

Son.—Why these names?

Father.—The seed-vessel is longer than broad, and therefore called a *silicle*: had it been broader than long, it would be called a

siliqua; and from being so very transparent, you can see the seeds by holding it against the light; hence called *Honesty*, as being easily seen through, and admitting of no deception: called *Moon-wort* (*Lunaria*, from *Luna*, the moon), because when the shells and valves drop off, the intermediate membrane has a fine silvery, glossy appearance, looking like the full moon, and as such is preserved in the winter nosegays.

Son.—Has not the Pea four petals?

Father.—It has four irregular petals, that is, not of the same size or shape, except two.

Son.—What is this called?

Father.—A *papilionaceous* flower, from *Papilio*, a Butterfly, which this flower very much resembles.

Son.—It looks very much like a butterfly indeed, when flying. Have these four petals particular names?

Father.—Yes; the uppermost petal is called the banner, or standard, *vexillum*, from its similitude to an erected flag: the undermost is called the keel, *carina*, from its resemblance to the keel of a boat; and the two side petals, which are alike, are called the wings, *alæ*.

Son.—Of what particular use is the *vexillum*?

Father.—In order to turn the flower from the wind; if you go into a pea-field you will find all the flowers turned one way, against the wind.

Son.—What other use do they serve?

Father.—To ward off the rain and heat from the stamens and pistil.

Son.—Have these any thing particular in their form worthy notice?

Father.—Yes; the filaments, instead of being separate, are here united together by a membrane.

Son.—Like the feet of a duck.

Father.—Exactly so.

Son.—Are all the filaments united?

Father.—Sometimes so; but not unfrequently they form two bodies,—nine being united, and one separate.

Son.—Favour me with examples.

Father.—First, the Spartium, Broom.

Son.—I have noticed the remarkable curling of the pistillum, like a French-horn, and of the stamina, in this plant.

Father.—The Lupin (*Lupinus*).

Son.—In casually looking at the ten stamina, I observe all the filaments, webbed at bottom; but afterwards, looking at the short filaments, I have noticed five anthers, linear or oblong, and five with globular anthers.

Father.—In the Pea (*Pisum*) one filament is easily separated from the other nine, which are webbed, by means of a pin.

Son.—Favor me with another example.

Father.—The *Hedysarum Gyrens*, or self-moving plant, has papilionaceous flowers, and at the base of each leaf are seen two leaflets, which are always in motion, making the most grotesque movements.

Son.—I would thank you for another example.

Father.—The common Kidney-bean has its keel spirally twisted like a screw, and this part looks like a shell. In the common Bean the alæ or wings are remarkable for a black spot at their extremities. These plants are many of them remarkable for climbing. The vines of Hops (which have flowers male and female,) wind about the poles with the sun; those of Kidney-bean against the sun, and that so obstinately, so firmly obeying the law impressed upon them, that although the one or other be over-night wound the opposite way, yet in the morning it will be found to have unwound itself, and to have returned again to its natural winding.

Son.—How are the seed-vessels of this natural tribe of plants?

Father.—They are called a Legume (*legu-*

men), having a seed-vessel of two valves; and the seeds are alternately arranged on one side of the shells only.

Son.—I think I have seen some curious seed-vessels arising from papilionaceous flowers.

Father.—In the Bladder-senna (*Colutea*), they are distended with air. In the Snail Trefoil (*Medicago*) they curl round so as to resemble a snail; and in *Scorpiurus*, they appear like caterpillars.

Son.—We come now to the, *Rosaceous*.

Father.—This is when there are five or more petals, regular, that is of the same size and shape, circularly placed, as in the Rose.

Son.—The thirteenth are called the *Liliaceous*.

Father.—The definition is the same here as in the last; but here the petals are fleshy.

Son.—This produces the most beautiful kind of corolla.

Father.—And forms the true climax. These plants are called *coronariæ*, from *corona*, a wreath, chaplet, or garland, and includes the most beautiful flowers of the vegetable kingdom. The roots here are often bulbous, the *hybernaculum*, or winter-quarters of the flower which may be found there, carefully concealed in miniature, all their parts even, their pistillum and stamina, being then visible.

RECAPITULATION.

The term **COROLLA** is a compound idea, like the word **CALYX**, and is made up of the following distinct notions, as—

- I. **BELL-SHAPED** (*Campanulata*), hollowed internally like a bell, often swollen at the sides, and without a tube.
- II. **WHEEL-SHAPED** (*Rotata*), slightly hollow, or the border flat, and with so little a tube as to resemble a wheel on the ground.
- III. **FUNNEL-SHAPED** (*Infundibuliformis*), having the border of the Corolla like a cone, and placed upon a tube, so as to resemble a funnel.
- IV. **SALVER-SHAPED** (*Hypocrateriformis*), having the border of the Corolla flat, and placed upon a tube resembling a salver.
- V. **RINGENT** (*Ringens*), having the border of the Corolla like two open lips, placed upon a tube, resembling a person
- VI. **PERSONATE** (*Personata*), having the border of the Corolla like the lips, the mouth closed, greatly resembling the snout of an animal, also placed upon a tube.

- VII. **TUBULAR** (*Tubularis*), when the floret of a compound flower ends in a tube, the border being five-cleft.
- VIII. **LIGULATE** (*Ligulata*), when the Corolla of the floret is linear, i. e. resembles the strap of a shoe.
- IX. **COMPOUND RADIATE** or **RAYED**, (*Radiata*), having the two sorts of flowers, *Tubular* and *Ligulate*;—*Tubular* in the *Disk* or centre, and *Ligulate* in the *Ray* or circumference.
- X. **CRUCIFORM** (*Cruciata*), having four petals, placed like a St. Andrew's Cross.
- XI. **PAPILIONACEOUS** (*Papilionacea*), having four petals, of different shapes and sizes, placed so as to resemble a butterfly on the wing.
- XII. **ROSACEOUS** (*Rosacea*), having five or more petals, not fleshy, orbicularly placed.
- XIII. **LILIACEOUS** (*Liliacea*), having six or more petals, fleshy, placed also in a circle.

FOURTH CONVERSATION.

ON THE DIFFERENT KINDS OF PERICARPS.

Son.—WHAT is a *Pericarp*?

Father.—The pistillum having received the farina of the anther, which falls upon the stigma, and is absorbed therefrom, the aura is carried to the seeds in the germen, which now becomes enlarged, when this part then loses the name of germen, and takes the appellation of *Pericarp*.

Son.—What is the derivation of the word *Pericarp*?

Father.—From *περι*, a Greek word, *peri*, around, and *καρπος*, *karpos*, the seed.

Son.—How many kinds of *Pericarps* are there?

Father.—Ten.

Son.—What are the names of the different *Pericarps*?

Father.—I. A *Drupe*. II. *Pome*. III. *Berry*. IV. *Follicle*. V. *Silique*. VI. *Silicle*. VII. *Legume*. VIII. *Capsule*. IX. *Nut*. X. *Strobile*.

Son.—What is the definition of the *first* species of Pericarp, the *Drupe*?

Father.—The *Drupe* is a fleshy or stringy pericarp, encompassing a stone; the name is from *Drupa*, Latin, a ripe olive.

Son.—What are the examples?

Father.—The *Peach*, *Apricot*, *Cherry*, and *Plum*; in short, all stone-fruits.

Son.—Are there not other examples?

Father.—The *Wal-nut* is a *Drupe*.

Son. I thought this was a nut.

Father.—No! it is a *Drupe*, for the pulpy part which surrounds the nut constitutes it, according to the definition, into a *Drupe*: it is a *Walled Nut*.

Son.—What do you say of the *Cocoa-Nut*?

Father.—This also is a *Drupe*, for the substance which surrounds the nut forms it into a *Drupe*.

Son. Please to define the *second* species of Pericarp, the *Pome*.

Father.—This also is a succulent Pericarp, having radiated cells, enclosing the seeds.

Son.—What is the derivation of the word *Pome*?

Father.—From the word *Pomum*, an apple, which is a good example of the definition.

Son.—I recollect the kernels, or pips in the

Apple, when cut in half, are in cells, radiating to the centre; it is so also in the *Pear*.

Father.—*Pear* is derived from *Pierre*, French, a stone, and this part is called the core, from the word *cor*, the heart, which is really stony, in the *Pear*.

Son.—How is it with the *Orange* and *Lemon*?

Father.—These botanists also reckon a *Pome*.

Son.—I should have taken it for a *Berry*, but I recollect the eleven rays which shoot from the centre, and in each quarter, as these divide into parts, there is a pip, or kernel.

Father.—The *Cucumber* is also esteemed a *Pome*.

Son.—This I should never have thought of, but I now recollect that the seeds are all placed looking towards a centre. To understand Botany, I see it requires to be scientifically instructed. I should wish now to know how to distinguish a *Pome* from a *Berry*.

Father.—A *Berry* also is a fleshy pericarp, but here the seeds are *irregularly dispersed*.

Son.—How is it with a *Strawberry* *?

* Called so from its long scions, resembling straws.

Father.—The seeds are here placed on the outside.

Son.—How with the *Mulberry**, and *Blackberry*†, and *Raspberry*‡?

Father.—These are called compound berries, *acini*, or a cluster of berries.

Son.—Is the delicious *Grape* a berry?

Father.—It answers the definition, having the seeds dispersed in a fleshy body.

Son.—How is the *Gooseberry* §?

Father.—The seeds here are placed in a circle affixed to the husk, or skin, by slender threads.

Son.—Is the *Pine-Apple* a berry?

Father.—So it is esteemed by Botanists, having the seeds in the projecting knobs, which gives this fruit much of the appearance of a strobile, the fruit of the pine-tree; and the only reason we feel reluctant to call it a berry, is from our having an erroneous idea that all berries contain a liquid juice.

Son.—I see more and more the necessity of being a scientific Botanist. Are these all the *Pericarps*, having a fleshy or pulpy body connected with the seeds?

* From mollis, soft.

† The Berry being black.

‡ So called from being rough,

§ Called so from being covered with down, like a goose.

Father.—Yes! And we may here generally remark, that there is a peculiarity in the growth of the flower.

Son.—Pray tell me what is that?

Father.—They have a calyx, monophyllous, consisting of one leaf, firm at the body, and cut into five segments. The stamens are all inserted into the fleshy substance of this calyx, in order to give them a firmer origin, and the pistillum emerges from the centre of this calyx; the germen, which afterwards becomes the fruit, is beneath; and hence, in these fruits, we find generally an *umbilicus*, which is nothing more than the withered calyx, as is seen in the apple, &c.

Son.—Were I cast away, should I at once know, what fruits were fit to eat?

Father.—With this scientific knowledge you could at once tell, whether any fruit was edible, or not; for there are no fruits whose flower has a calyx, giving origin to the stamens, but are serviceable to man.

Son.—I see now more than ever, the advantage of knowing Botany as a Science.

Father.—We will leave now the fleshy pericarps, and proceed to those that have a dry substance.

Son.—What is the *Follicle*?

Father.—It is a pericarp of one piece, or

valve, which opens from the bottom to the top on one side, letting out the seeds, which are not attached to any suture of the valve.

Son.—What is the derivation of this word?

Father.—From *tollis*, a pair of bellows, which it is thought to resemble.

Son.—What is an example of this?

Father.—*Vinca Major*, the Perriwinkle, and *Apocynum*, or Dog's-bane.

Son.—What is the meaning of the word *suture*?

Father.—From *sutura*, a sowing, is the projecting part, or rib, of a valve; as we see the ribs in leaves, called in them also nerves.

Son.—What is the meaning of the word *valve*?

Father.—From *valvula*, a valve, or door; is the body of the seed-vessel itself, acting as a valve to keep in the seeds.

Son.—What is a *siliqua*, the *fifth* species of seed-vessel?

Father.—It is the seed-vessel of a cruciform flower, before explained, page 51, and opens from the bottom to the top by two valves.

Son.—What makes it open so readily from the bottom?

Father.—The stigma is at top permanent, and keeps the valves from falling asunder at this part.

Son.—Do not some valves roll back?

Father.—Yes, as the *Cardamine pratensis*, called Ladies' Smock, from covering the fields with white patches, looking like linen-bleaching in the field. Thus Shakespear :

“ And Ladies' smocks, all silver white,
“ Do paint the meadows with delight.”

Recalling to us the pleasure of early recollections.

Son.—How are the seeds attached to this species of pericarp.

Father.—There is a central part covered by the valves, called the *dissepiment* (dissepimentum), the margin of which has a rib, which runs round it, forming a strong boundary, which nerve, or rib, is called its *suture*. The seeds are attached to both sutures alternately, so as not to interfere with each other.

Son.—I wish this to be further explained.

Father.—The seeds are affixed to both sutures alternately.

Son.—So far I understand.

Father.—There is a vacancy made for the admission of the seeds on both sides, that is, whenever there is a seed proceeding from the right hand, there is a vacancy on the left side, and so on with the other side, so that every place is occupied by alternate vacancies.

Son.—This I now fully comprehend; and

see the wonderful order, regularity, and various contrivances of Nature.

Father.—The Common Stock (*Cheiranthus*) is an example of this kind of seed-vessel; the Water-Cress (*Sisymbrium*), and Mustard (*Sinaps*), also the Brassicas (Cabbages), afford other examples, and in the Radish (*Raphanus*), the pods are jointed.

Son.—What is the derivation of this word?

Father.—From *siliqua*, Latin, for a pod.

Son.—What is a *silicle*?

Father.—From *silicula*, Latin, for a small pod, is the same kind of seed-vessel, usually small, and never a long pod, as the breadth much exceeds, or equals the length.

Son.—Give me an example.

Father.—The round seed-vessel of *Honesty* (*Lunaria*), and the *Shepherd's Purse* (*Thlaspi Bursa Pastoris*), which resembles the purse of a shepherd. — *Honesty* is also called *Satin Flower*, from the dissessment, being a membrane, looking like the finest satin; and the *Shepherd's Purse* I have known called the *Shepherd's Heart*, the silicle looking like a heart.

Son.—Has Linnæus availed himself of these differences in the seed-vessel in his system.

Father.—He has made them the two orders of the Class XV. *Tetradynamia*, which contain the cruciform tribe of plants.

Son.—I recollect well that natural tribe of plants, with four petals, placed cross-wise. The knowledge acquired now will be of advantage to me, I see, when I come to study the Classes and Orders of Linnæus.

Father.—It will, certainly.

Son.—There is a pretty plant I saw yesterday, with a beautiful white flower, and the four petals are cross-shape; but two of them are very large in comparison of the others, and these are bifid; the seed-vessel is a *silicle*—pray what is the name of the flower?

Father.—It is called Candy-Turf (*Iberis*), Candy from *Candidus*, white, I know it from your description of it; but, had you described it unscientifically, I should be wholly at a loss to guess at what you meant.

Son.—How are the descriptions of flowers of circumnavigators unacquainted with the science of botany?

Father.—Completely unintelligible.

Son.—Please to define the *seventh* species of pericarp, the *Legume*.

Father.—*Legume* is derived from the Latin word, *legumen*, which means all kinds of pulse, as peas, beans, &c.

Son.—Do not the French call these seeds, legume.

Father.—Yes, but here the term is applied

to that particular seed-vessel, which divides into two valves, which we call shells, from the great resemblance they have to a muscle shell, or other shells of that nature, concave within, and the margins braced, or hemmed round, with a strong rib or fibre called a suture, to the under sutures of which only are the seeds attached.

Son.—Are they not placed alternately?

Father.—Yes, they are, as in the other species of pericarp, the Silique.

Son.—What is the great distinction of these two?

Father.—The *legume* has no dissection. The seeds are also attached to the under sutures only, whereas in the silique, the seeds are attached to each suture, both the upper and the under.

Son.—Is there any other marked character?

Father.—Yes, the legume is the seed-vessel of the *papilionaceous* flowers.

Son.—I understand the papilionaceous corolla, from what you said in your third conversation.

Father.—Pease and beans serve us for food, and the leaves, particularly of clover, lucern, vetch, and saintfoin, afford excellent pasture for cattle.

Son.—There is a kind of down in the legume of the bean and lupine.

Father.—Yes, and some of them are remarkably jointed, as the bird's-foot trefoil, and jointed-podded coronilla.

Son.—I remember putting the pods of Bladder-senna on the back of the hand, and being filled with air, was wont to strike them, when they exploded with a loud noise.

Father.—Yes; and this seed-vessel you now know is a legume.

Son.—Are not some of them very curious in appearance?

Father.—Yes, as the *snail-trefoil* (*Medicago*) *Caterpillars* (*Scorpiurus*) in the *hippocrepis* it is shaped like an horse-shoe, and in the *hedy-sarum clypeatum*, it is round like a shield.

Son.—How is the *eighth* species of seed-vessel defined?

Father.—The *Capsule*, diminutive from *capsa* a box, which is a dry, hollow seed-vessel, that cleaves or splits in some determinate manner.

Son.—How is it distinguished from the other seed-vessels?

Father.—From its not having the characters peculiar to the others.

Son.—Have not some of these remarkable openings for the liberation of the seeds?

Father.—In the *Poppy* the stigma is radiated, and acts as a shield or roof of a house,

closing every aperture; but when the seeds become ripe, this rises up, leaving many curious openings from the escape of the seeds.

Son.—How is it with other flowers?

Father.—In the *Pimpernel*, or poor man's weather-glass, from the closing of the corolla on the approach of rain, the capsule opens longitudinally, like a conjuring-box.

Son.—Have not some of them a remarkable power of ejecting their seeds.

Father.—In that beautiful plant, the *balsam*, after flowering, the capsules, if pressed betwixt the finger and thumb, being ripe, curl violently back, first throwing out the seeds, hence called in Latin, *impatiens*. The spirting cucumber (*momordica elaterium*), does this in a more conspicuous manner, as they actually spirt out their seeds into your face, and if you strike your hand on the wood-sorrel, (*oxalis acetosella*), the seeds will spread themselves out into every direction.

Son.—Are the Capsules divided in cells?

Father.—Yes, these are called *loculamenta*, and are exceedingly diversified in point of number; for some capsules have one cell, as the *primrose* and *pink*; others many, as the *water-lily* and *poppy*. This word has been used also to express the cells in some kind of anthers, as in the *salix fragilis*.

Son.—What are the partitions of those cells called?

Father.—The term *dissessiment* (dissessimentum) is also used again here.

Son.—What is that substance often found in the centre of the capsule, called?

Father.—*Columella*, from *Columna*, a column, or pillar, that central part whence all the dissessimenta and partitions proceed, as from a radius, or centre.

Son.—What is the definition of the *ninth* species of pericarp.

Father.—The *Nut* (*Nux*) is a woody covering, enclosing a kernel (nucleus).

Son.—How is this distinguished from the *Drupe*?

Father.—As having no other external covering?

Son.—What are the examples?

Father.—The common Hazle-Nut (*Corylus*), and the Filbert.

Son.—What is the definition of the *tenth* species of pericarp.

Father.—It is called a *Strobile* (the Latin name for an Artichoke, which it somewhat resembles), before named *Conus*, a cone, from its conical figure, from *κωνος*, *konos*, cone, being scales, which run in the direction of a

screw in the most artful manner, each scale covering a seed.

Son.—Can I easily get at these seeds?

Father.—No power of the chisel or hammer can open these scales; but, if they be immersed into hot water, they will then open spontaneously.

Son.—What kind of seeds do they appear to be?

Father.—They are edible, and winged for the purpose of dissemination.

Son.—What does the strobile most resemble?

Father.—An ament, with hard ligneous scales.

Son.—Will you kindly, as formerly, *recapitulate* what you have before said?

RECAPITULATION.

Father.—After the smell and sight have been regaled by flowers, this beautiful construction passes away, and the *germen* alone increases, and, finally, becomes a *pericarp*.

TEN different sorts of PERICARPS, or SEED-VESSELS, are enumerated by botanists.

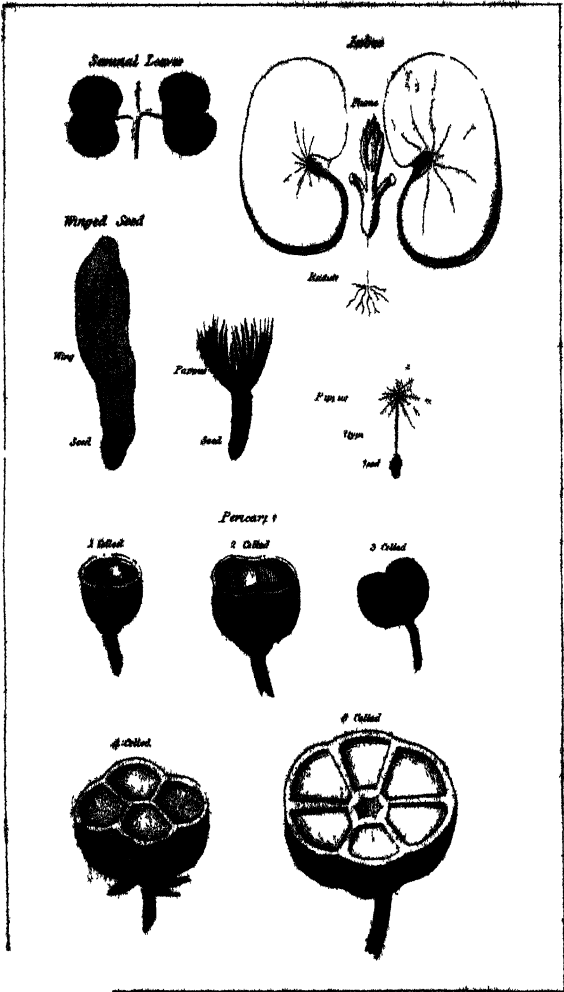
- I. **DRUPE** (*Drupa*) is a pulpy seed-vessel, encompassing a stone, or nut.
- II. **POME** (*Pomum*) is a pulpy seed-vessel,—not enclosing a stone, or nut, in the middle of which are radiated cells for the reception of seeds.
- III. **BERRY** (*Bacca*) is a pulpy seed-vessel, without radiated cells in the centre, having the seeds irregularly dispersed throughout the pulp.
- IV. **FOLLICLE** (*Folliculus*) is a membranous seed-vessel, of one valve, opening longitudinally, i. e. on the side, and having no apparent suture for fastening or attaching the seeds within it.
- V. **SILIQUE** (*Siliqua*) is a membranous seed-vessel, of two valves, with a dissepiment intervening, seeds attached alternately to the upper and under sutures, seed-vessel longer than broad, flowers cruciform.
- VI. **SILICLE** (*Silicula*) has the same definition as the last, except that the seed-vessel is rather broader than long.
- VII. **LEGUME** (*Legumen*) is a membranous seed-vessel, of two valves, no dissepiment, seeds attached to the superior suture only, flowers papilionaceous.
- VIII. **CAPSULE** (*Capsula*) is a membranous

seed-vessel, varying in the number of valves, without the characters of the other Pericarps, as defined above, opening in a determinate manner.

IX. NUT (*Nux*), a hard stone, or shell, enclosing a kernel, but without a pulpy covering, in which case it would be a **Drupe**.

X. STROBILE (*Strobilus*) is a seed-vessel composed of ligneous scales, which embrace the seeds within their bosom.

All the *Recapitulations* should be committed to the memory, and a lesson thus learnt, is worth an hundred others, as the impression made *early*, would never be forgotten. This may be called a trouble, but is there any thing great or noble in the world, to be procured without trouble?



FIFTH CONVERSATION.

ON THE DIFFERENT KINDS OF SEEDS.

Son.—How has Linnæus defined the seed?

Father.—As vegetable eggs, contained in the seed-vessel, or calyx, which possess each, when fertilized, the rudiments of a new plant.

Son.—Of what parts are the seeds composed?

Father.—The outer covering, or skin, is called the *arillus*, from the Latin word, *arere*, to be parched, as being a dry husk, which falls off. On this arillus we usually observe a black line, which is called *hilum*, from the Latin word *hilum*, a speck.

Son.—Of what use is this *hilum*? The service of the arillus, I understand.

Father.—The *hilum* is the thinner part of the seed-case, out of which the *plantule* shoots.

Son.—Oh! I have observed this in the sprouting of the Bean. The *arillus* we call the *husk* in the Bean, which we throw off when we eat it; and pray what is that part called which forms the *plantule*?

Father.—Under this *hilum* is placed the *corculum*, a diminutive word from the word

cor, the heart, being the *plantule* in its first state, or embryo of the future vegetable.

Son.—Why have Botanists invented this term?

Father.—Because, by incubation of the egg, the first part formed is the heart, the *punctum saliens* of Anatomists.

Son.—Are not Squirrels and Ants said to eat away this embryo in the seeds they wish to preserve?

Father.—So it is reported; for in truth this *corculum* is the essence of the plant.

Son.—And pray what are the other parts called?

Father.—The *lobes*, or *cotyledons*, the perishable porous parts of seeds, which involve, and for some time feed with nutritive juices, the embryo plant.

Son.—The mealy part of Beans, which we eat, are then called cotyledons or lobes?

Father.—You see them rising above ground in some plants, and very conspicuous in the Bean and Lupine; and this stage of growth is called *germination*.

Son.—What is the meaning of the word *germination*?

Father.—From *germen*, a bud; it is the sprouting of the *corculum*, and increase of the *cotyledons*.

Son.—Is not our Malt, we use in brewing, Barley in this first stage, whereby it obtains a saccharine sweetness? *

Father.—Yes.

Son.—And is not this sweet juice analogous to Milk?

Father.—Almonds, when boiled, produce a liquor so much resembling Milk, as to be called Milk of Almonds.

Son.—To what then do you liken these lobes?

Father.—To the mammæ, or breasts of animals.

Son.—Has Providence in a similar manner provided for young plants, as for animals?

Father.—Exactly; and if these lobes be removed, the infant plant dies.

Son.—But have all plants these lobes?

Father.—Such as have not lobes produce two *seminal leaves*, the grasses but one.

Son.—Do these differ from the other leaves?

Father.—You see them very conspicuous in the Cucumber, looking like lobes; and these leaves are very succulent, and of a different shape from the other leaves.

Son.—I have observed the seeds sown in my little garden to shoot out with a peculiar kind of leaves, different from what the plant afterwards had; but I never understood these

to be the *seminal leaves* for the nourishment of the infant plantule, until now.

Father.—You must acknowledge, then, the great advantages that are derived from a scientific observance of Nature.

Son.—Seeds vary in their time of rising, or germinating?

Father.—Yes; in the middle of April the several Grasses and Cress rise in one day, also the Cucumber, Gourd, and Melon, with heat; Mustard, Turnip, Radish, and the Cabbages, in three days; Lettuce in four; Wheat and Barley in about a fortnight; whereas Parsley takes forty or fifty days, and sometimes longer.

Son.—Oh! now I understand a saying, that *Parsley*, before it comes up, goes nine times to the Devil; and I remember several gardeners, from ignorance of this fact, digging up the sown Parsley, and thus dispersing it over the garden.

Father.—There are some seeds which lie dormant in the earth for a great number of years; hence in digging of banks, plants have arisen which were never before known in those quarters, as the *white clover*, and *mustard*.

Son.—Do any seeds remain in the ground a whole year before they germinate?

Father.—Yes; as the stone fruits, Peach, Almond, Walnut; and the seeds in the follow-

ing capsules, Chesnut, Pæony, and Horned Poppy.

Son.—Do not some remain longer than this?

Father.—The Rose-bush, Cornel-tree, Hawthorn, Medlar, and Hazel Nut, are two years before they rise.

Son.—I have often observed two holes in the Cocoa Nut, which, taking the Hilum for the mouth, has given this fruit the appearance of a Monkey's head; for what purpose are these holes?

Father.—For the passage of the *plumule* and *radicle*.

Son.—Does the *corculum* then shoot out into two parts?

Father.—Yes; one constantly ascends called *plumule*, from *plumula*, a little feather, which it in some degree resembles; and the other the *radicle*, a word derived from *radix*, a root: *radicula*, in Latin, means a little root, which as constantly descends.

Son.—If these eyes then, are on the top, does the radicle curl downwards; and if at the bottom, in the ground, does the plumule curl round to ascend?

Father.—This wisdom in Nature you may also observe in the Bean and other plants.

Son.—Have any experiments been instituted to ascertain so curious an instinct, resembling reason?

Father.—A garden-pot, after the ascent of the *plumule*, has been *inverted*; but the *plumule* has always curled upwards in search of air and light.

Son.—Does this property belong to the plant after it has attained its growth?

Father.—Yes! for if a branch be pressed down by a weight, or tied by a string so as to point downwards, the extremity will take a contrary curve, upwards.

Son.—Do not the leaves of many plants face the light?

Father.—If you turn a Geranium plant from the light, you will find all its leaves in disorder, in their effort to bring their leaves towards the window, which they will at last accomplish.

Son.—Suppose a plant shut up in a loft, with one aperture for light from the breaking of a tile, what would be the effect?

Father.—The plant would shoot out to that spot, and escape by this aperture of the roof into the open air.

Son.—In this search after light, have any plants a most remarkable growth?

Father.—One of the Indian grasses, the *Panicum arborescens*, whose stem is no thicker than a goose-quill, if surrounded by trees, will

rise as high as the tallest tree, in this contest for light and air.

Son.—I see now the reason, why plants crowded together, are so spindle-shaped. Nature is constantly displaying her wisdom.

Father.—The mode Nature adopts for *the dispersion of seeds* is truly admirable.

Son.—Favor me by giving some examples.

Father.—The *Cocoa-nut* has all the appearance of a boat, and when it falls into a river, it is carried down the tide into the sea, and this precious fruit becomes wafted to other climes: *Cassia* is an American fruit, which is annually thrown on the coast of Norway, and afterwards, when committed to the ground, will be found to vegetate. The pericarp of the *cashew-nut* (*anacardium*) of the *bottle-gourd* (*cucurbita lagenaria*) and *cocoons* (*mimosa scandens*) of the *log-wood tree* (*piscidia erythrina*) are often observed amongst these emigrants, or floating seed-vessels. The *lenticula marina*, or *Largosso*, grows on the rocks about Jamaica, and is carried by the winds and currents towards the coasts of Florida, and thence into the North-American Ocean, where it lies very thick on the surface of the sea.

Son.—Are there any remarkable foreign seeds thrown on the coast of Scotland or Ireland?

Father.—Sir Hans Sloane mentions in particular, three kinds of seeds, natives of the West Indies, which are frequently thrown by the sea upon the coasts of the islands of the northern parts of Scotland. One of these is called *Phaseolus maximus perennis*, which is often thrown also on the coast of Kerry, in Ireland; another is called the Jamaica *Horse-eye-bean*; and a third is called the *Niker* in Jamaica.

Son.—Are not some seeds disseminated by birds?

Father.—It is a singular provision in Nature, to make many of the drupes, pass through the intestines of birds, and what is very curious, these will then grow the same year, which they otherwise would not.

Son.—Is not the holly sown in this manner?

Father.—The berries are devoured by birds, and thus become dispersed and sown, and as the bird-lime is produced from this bush, they are said to produce their own destruction.

Son.—Are any other seeds thus disseminated?

Father.—It is said that the *nutmeg* will not vegetate, unless it passes through the stomach of a certain bird, which is on that account held sacred in those countries where this spice is produced.

Son.—Do not birds and animals often drop the seeds they are conveying away?

Father.—In this way whole plantations of oaks have been formed; and thus rats and mice widely disseminate the seeds of plants by dropping them.

Son.—I have heard strange stories of monkeys acting in this way.

Father.—Yes, they often go out robbing orchards, when they take the fruits in both their arms, under the arm-pits, and in their mouths, and when frightened, first throw away what they hold in their hands, and even mouth, in order to effect a sure escape.

Son.—Is not the *mistletoe* sown in this way?

Father.—The berries are of a milk-white, and contain so viscous a juice, that they adhere to the branches of whatever tree they be carried to, and the Mistletoe Thrush is a bird, which has obtained its name, from thus sowing this parasitical plant.

Son.—What do you mean by the word parasitical?

Father.—As deriving nourishment from other plants. Thus *mistletoe* and *vanelloe* cling to the branches of trees; *hypocistis* to the roots of plants, particularly of the cistus, or rock-rose, whence its name is derived; *dodder*, to the stems of all sorts of plants, although it be generally found attached to thyme; but the

most remarkable appearance of design is the pappus of the *Tillandsia* for that purpose.

Son.—How is that?

Father.—This plant grows on the branches of trees, like the misletoe, and never on the ground. The *Tillandsia*, or wild pine of the West Indies, has every leaf terminated near the stalk with a hollow bucket which contains from half a pint to a quart of water, and the seeds are furnished with many long threads for their crown, or pappus, which as they are driven forward by the winds, wrap round the arm of trees, and thus hold them fast until they vegetate. This is very like the migration of spiders on the Gossamer, who spin a fine thread, and thus rise to the tops of trees, or buildings, as the accidental breezes carry them.

Son.—I have often admired the seeds of a grass, which very much resembles a feather.

Father.—This is called the *Feather-grass* (*Stipa pinnata*), which has an awn so much resembling a feather, that the seeds when floating appear like so many feathers in the air.

Son.—I think you said the seeds of the compound flowers had most of them a pappus, or crown.

Father.—True; by which admirable mechanism they are disseminated by the winds.

far from their parent stem, and look like so many shuttlecocks floating in the air.

☛ *Son.*—Are not other seeds in the other classes of flowers furnished in like manner?

Father.—Yes, some of them are so, as in the poplars and willow, the dispersion of whose seeds looks like a stript feather-bed.

Son.—I have often seen an oat-grass creeping along the ground.

Father.—This is called the *avena fatua*, *mad oat*, which if placed upon a table, after being moistened with water, they will twist themselves about, with so much appearance of life, that they have been called the *animated oat*, and we may remark, that the awn of barley is furnished with stiff points, which, like the teeth of a saw, are all turned towards one end of it; as this long awn lies upon the ground, it extends itself in the moist air of night, and pushes forward the barley corn, which it adheres to; in the day it shortens as it dries; and as these points prevent it from receding, it draws up its pointed end; and thus, creeping like a worm, will travel many feet from the parent stem. That very ingenious Mechanic Philosopher, Mr. Edgeworth, once made on this principle a wooden automaton; its back consisted of soft fir-wood, about an inch square, and four feet long, and made of pieces cut the cross way

in respect to the fibres of the wood, and glued together: it had two feet before, and two behind, which supported the back horizontally; but were placed with their extremities, which were armed with sharp points of iron, bending backwards. Hence, in moist weather the back lengthened, and the two foremost feet were pushed forwards; in dry weather the hinder feet were drawn after, as the obliquity of the points of the feet prevented it from receding. And thus, in a month or two, it walked across the room which it inhabited.

Son.—Of what use are worms?

Father.—I am not now surprised at your question, for we see that moles, rats, mice, and rabbits, &c. make holes in the ground, into which seeds fall and vegetate, and the pig turns up the ground like a plough, but worms are every where at work, where they feed upon the fine mold, and come to the top to return it again, thus preparing the earth for the reception of seeds.

Son.—If all seeds found a proper nidus, would not the whole world be covered with plants?

Father.—Yes, as in one plant, or stalk of Indian wheat was produced in one summer, 2000 seeds; of elecampane, 3000; of sun-flower, 4000; of poppy, 32,000; of a spike of cat's-

tail, 10,000; a single pericarp, or seed-vessel of tobacco, contained 1000 seeds; and that of white poppy 8000. Mr. Ray relates from experiments made by himself, that 1012 tobacco seeds are equal in weight to one grain; and that the weight of the whole quantum of seeds in a single tobacco plant, is such as must, according to the above proportion, determine their number to be 300,000. The same author estimates the annual produce of a single stalk of spleen-wort, to be upwards of one million of seeds.

Son.—How then is this growth kept under?

Father.—The all-wise CREATOR has produced myriads of insects, who feed upon plants, so that all Nature teems with life, so that HIS greatness, power, and goodness, is not less seen in the minutest insect, than in the larger kind of animals.

Son.—Are they constructed as ourselves?

Father.—With an equal degree of wisdom.

Son.—Pray favour me by enumerating the different kinds of SEEDS.

Father.—SEEDS present so great a diversity of appearance, that they cannot, like the CALYX, COROLLA, or PERICARP, be grouped into distinct assemblages, but must be presented to the reader individually, of which the following are some of the most striking examples.

1. A DOUBLE-SEED, EACH RESEMBLING A BOAT (*Semen duplex, naviculæ formam repræsentans*), as in Fennel, and the umbelliferous plants.

2. KIDNEY-SHAPED, WITH PENTAGON AND HEPTAGON CELLS (*Reniforme, cellulis pentagonis et heptagonis*), as the Poppy.

3. OVATE (*Ovatum*), shaped like an egg, as in Eyebright.

4. GLOBULAR (*Globosum*), as the Pea.

5. SQUARE (*Tetragonum*), having four sides, as the Foxglove.

6. TRIANGULAR (*Triangulare*), having three sides, as the Tansey.

7. CYLINDRIC (*Oblongum*), oblong, as St. John's wort.

8. RESEMBLING A PARTICULAR SHELL (*Figuram chonchæ mentiens*), as Sorrel.

9. Ditto, Purslane.

10. Ditto, Cinquefoil.

11. RESEMBLING THE HEAD OF A MONKEY (*Figuram cynocephali repræsentans*), as the Cocoa-nut.

12. A SINGLE CROWN (*Corona simplex*), Common Thistle.

13. A DOUBLE CROWN (*Corona duplex*), Holy Thistle.

14. A SHUTTLE-COCK (*Corona pennacea*), as Dandelion.

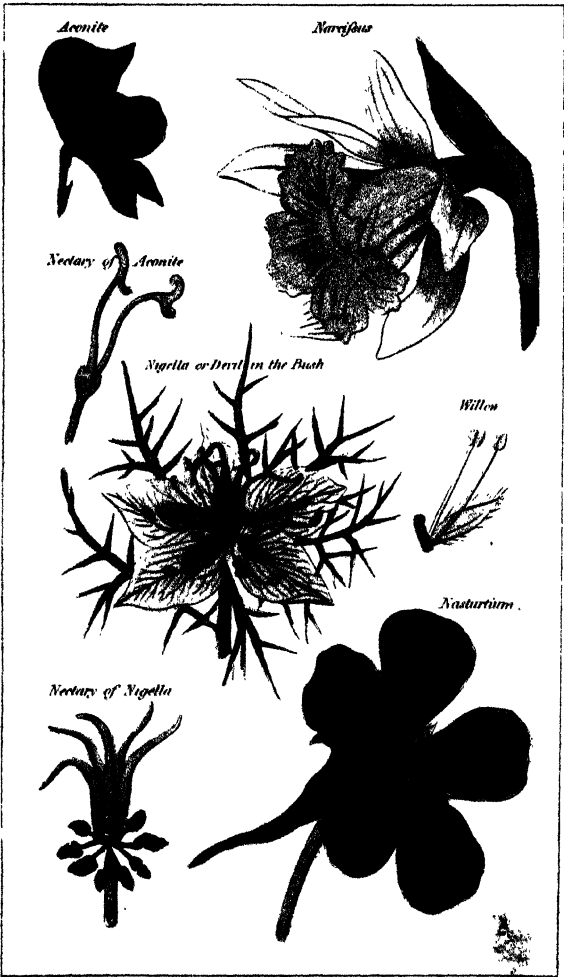
Son.—I would thank you for a recapitulation.

Father.—This I will do with pleasure.

RECAPITULATION.

- I. VALVES (*Valvulae*), are the external pieces forming the sides of the seed-vessel.
- II. SUTURES (*Suturae*), are the edges or margins, by which the valves are connected.
- III. COLUMN (*Columella*), is a central point of union of the partitions in the seed-vessels.
- IV. PARTITIONS (*Dissepimenta*), are the divisions of the seed-vessels into cells, also the membrane of the silique, and silicle, to which the seeds are attached.
- V. CELLS (*Locumenta*), are hollow places for the reception of the seeds.
- VI. ARIL (*Arillus*), is the outer coat of the seed.
- VII. EYE (*Hilum*), is an oblong scar, marking the place where the seed was affixed by an umbilical cord to the seed-vessel, under which is placed the heart.
- VIII. HEART, or GERM (*Corculum*), the rudiment of the young plant within the seed.

- IX. PLUME** (*Plumula*), the ascending part of the corcule, or infant stem.
- X. RADICLE** (*Radicula*), the descending part, or infant root.
- XI. COTYLEDONS** (*Cotyledones*), the side-lobes, furnishing nourishment to the corculum.
- XII. SEMINAL LEAVES** (*Folia Seminalia*), the first leaves of the plantule, serving the office of cotyledons or lobes.
- XIII. PAPPUS** (*Pappus*), is a feathery crown placed on some seeds.
- XIV. CROWNED SEEDS** (*Semina coronata*), seeds having a coronet or pappus.
- XV. STIPE** (*Stipes*), a thread connecting the pappus to the seed.
- XVI. NAKED SEEDS** (*Semina nuda*), seeds not covered by a capsule, or having a pappus.
- XVII. COVERED SEEDS** (*Semina tecta*), seeds enclosed in a capsule.



SIXTH CONVERSATION.

ON THE DIFFERENT KINDS OF NECTARIES.

—I SHOULD feel much obliged to you, to discourse a little more of the *Nectary*.

Father.—This part formerly was so little noticed, that before the time of Linnæus, it had not even a name, and was confounded with the *Corolla*.

Son.—Is the definition given by Linnæus subject to objection?

Father.—By no means, as this part usually contains honey, and it matters not as to name, provided there be a full and clear definition given of the term.

Son.—Do not many flowers secrete honey, without any mention being made of their having a *Nectary*?

Father.—Yes, as the *Honeysuckle* (*Lonicera*), so called, because the tube of the *Corolla* contains at its base, a quantity of *honey*, and thus *suckles* the bee or butterfly, or, more probably, *suckle* may mean a *froth*, often found on this plant, like *spittle*, produced by an insect. Other monopetalous tubular

flowers also contain this liquor, as the compound, especially the common Thistle.

Son.—Is not this Nectar very profuse in some flowers?

Father.—In the flowers of the *Arbutus unedo* (Strawberry tree), it is so profuse, as to run out, when the Corolla is open, and it so much resembles the smell of honey, that you might mistake the scent; also in the Honey-flower (*Melianthus*).

Son.—Why do you pronounce the u in *arbütus* short, when gardeners call it universally *arbütus*, the Arbuté tree.

Father.—Virgil makes it short, thus ending a line, *arbütüs atque*, which is sufficient authority.

Son.—Does not the wild Thyme produce the best honey?

Father.—The Butterfly-shaped flowers have in their base a quantity of honey, and it is curious to go through a bean-field, when you will find a perforation made through the Calyx, in almost every flower. Clover also contains a quantity of honey.

Son.—Oh! I have seen the bees and butterflies very active in their search after honey. Are there any kind of birds which feed upon this nectareous juice?

Father.—Yes; the humming bird, some of

them hardly bigger than a bee, have a long bill for the purpose of extracting honey from flowers, on which they wholly subsist.

The learned Doctor Darwin mentions that our little wren is often seen running up the stem of the crown-imperial, darting into the flower, and fluttering in its bell, and extracting from it the nectareous juice.

Son.—For what is this plant most remarkable?

Father.—As having at the base of each petal, a small round hollow, like a saucer, containing honey.

Son.—I have seen some butterflies, which like bats, only fly at night.

Father.—These are called *Moths*, whose bodies resemble butter more than the butterfly, and there are flowers, which open at night, to furnish them with food, as the Evening Primrose (*Ænothera*), and the Night-blowing Cereus (*Cactus Grandiflora*). This flower is a native of Jamaica and Veracrux. It expands a most exquisitely beautiful corol, and emits a most fragrant odour for a few hours in the night, and then closes to open no more. The flower is nearly a foot in diameter; the inside of the calyx of a splendid orange, and the numerous petals of a pure white; it begins to open about seven or eight o'clock in the evening,

and closes before sun-rise in the morning. The flowers of the cucurbita lagenaria are said to close when the sun shines upon them. In our climate many flowers, as tragopogon, and hibiscus, close their flowers before the hottest part of the day comes on; and the flowers of some species of cucubalus, and silene, viscous campion, are closed all day; but when the sun leaves them they expand, and emit a very agreeable scent; whence such plants are termed, noctiflora.

Son.—I have seen one particular moth, which looks very beautiful, being as if painted in variegated red and black, I should like much to know its history.

Father.—Many insects are provided with a long and pliant proboscis for the purpose of acquiring this grateful food, as a variety of bees, moths, and butterflies; but the *Sphinx Convoluti*, or unicorn moth, is furnished with the most remarkable proboscis in this climate. It carries it rolled up in concentric circles under its chin, and occasionally extends it to above three inches in length. This trunk consists of joints and muscles, and seems to have more versatile movements than the trunk of the elephant; and near its termination is split into two capillary tubes. The excellence of this contrivance for robbing the flowers of their

honey, keeps this beautiful insect fat and bulky, though it flies only in the evening, when the flowers have closed their petals, and are thence more difficult of access; and at the same time the brilliant colours of the moth contribute to its safety, by making it mistaken by the late sleeping birds for the flower it rests on.

Son.—If it would not be too intruding, I should like to know something of the economy of the *Bee*.

Father.—The history of this insect is also so interwoven with the science of Botany, that it merits a consideration here.

Son.—Their construction appears to me formed for flowers.

Father.—Exactly so, for nothing can be more curious than the proboscis, or trunk of the bee, which is not spirally rolled, as in the butterfly, but bends back with a joint like a pen-knife, which is shut, as this part would be much subject to dangers, if constantly extended. It is called proboscis, as it resembles in shape and power, the trunk of the elephant, and it possesses a firmness, suiting it to force its passage into the nectary, and of conveying the honey into the stomach, where it is formed into that kind of honey, found in hives, being disgorged from the stomach in its perfect state.

Son.—How is the wax formed?

Father.—On the second and hinder pair of legs (for bees have six legs) we may notice a species of brush, which these little creatures moisten, and then they go to the anthers of flowers, to collect from this part the *farina*. These globules are attached to the four brushes of these insects, as much as if we were to wet our fingers, and pass them over flour. With the two front legs they form this *farina* into a pellet, and swallow this also into their stomach, which they disgorge, and make from it their waxen *cells*.

Son.—How are these formed?

Father.—With the perfect wisdom of a geometrician, by producing *hexagonal cells*, that is, six-sided cells, a figure which realized the problem, how the utmost space may be given, with the smallest quantity of material.

Son.—Do they not build from the top?

Father.—Yes; the moment they enter a hive, the first thing is to stop every crevice; this is done with a substance which they collect from trees; and which they employ as they find it, without being forced to make any change in it. It is thought to be from poplar, birch, and willow, that they collect it; it is called *propolis*, and is a substance easily dissolvable in spirits of wine and oil of turpentine; which grows very hard in the hive, but which may always be softened by heat: it commonly has

an agreeable scent : it is soft when the bees use it to careen the hive. The bees will even work in the night at this. The bees choose the morning for gathering the crude wax ; the evening for the propolis ; but not exclusively. They bring this substance in their hinder legs ; others tear it away, and pluck it with their teeth : it draws out like a thick gum.

Reaumur had a hive with a moveable stopper ; this the bees sealed with their propolis : he removed it ; and when it was replaced, some of the substance remaining on the outside, he had the pleasure to see the bees convey great part of it away. The bees cover with this substance such bodies as annoy them, and are beyond their power to remove : a snail which crept into the hive was so treated.

Son.—As they show such sagacity at the onset, I expect to hear of more as you advance.

Father.—They establish two kinds of cells, smaller ones for the birth of the drones, which are the males, and the working bees, or neuters, and the

ROYAL CELL

in which the queen is born, the only female, who, when she has left her palace, the bees instantly destroy it, and build ordinary cells over it, but as they leave the foundations, we plainly see that part of the comb where this

happened; it being a little thicker in this place than any other, and there appearing a kind of knot upon it.

An unfinished cell for raising queen bees, weighed against others, equalled nearly an hundred: Reaumur believed one would weigh nearly as much as an hundred and fifty: they are fifteen or sixteen lines in length; oblong; the largest end uppermost, and the lower end open, till the season for closing it comes; namely, when the worm is ready for transformation.

Son.—I do not understand that last word, pray explain it.

Father.—Insects undergo a wonderful metamorphose. You see the *caterpillar* crawling upon earth, voracious, eating leaves, this then spins itself a tomb, and is converted into a lifeless *crysalis*, which in turn changes into the winged *butterfly*, feeding upon honey.

Son.—How wonderful these changes!

Father.—So it will be with our gross body; it is sown in dishonour, it will be raised a spiritual body, we shall all be changed, in the twinkling of an eye, for the dead shall be raised, this corruption shall put on incorruption, and this mortal body shall be blest with immortality.

Son.—What, does not the same body rise?

Father.—No, for the inspired Apostle says, that as the seeds differ from the plant, an oak from an acorn, so shall our terrestrial bodies differ from the celestial.

Son.—The instinct of these little creatures proves the vast power of the Creator.

Father.—The volume of Nature is a book, which most forcibly points out the power, wisdom, and goodness of the Creator of all things.

Son.—How do bees exist, when there are no flowers?

Father.—There is another proof of the wisdom of God, for they *sleep* during the winter, and only awoken with the return of spring.

Son.—Why do they then provide a store against the winter?

Father.—This is in case of the too speedy return of spring, and awakening, as it were, from death, they might then have occasion for their winter stock, but it is found in very warm climates, they have no torpor, nor do they then collect a winter's stock.

Son.—Do not bees do a great disservice to flowers by robbing them of their *farina*?

Father.—Their honey seems as an inducement for bees to go from flower to flower, and their little thighs being loaded with *farina*, this is carried to the several flowers, and some part

escapes upon the pistillas, thus rendering them prolific, and repaying the theft.

Son.—Have not all the flowers of the same kind, the nectary ?

Father.—No; in the willow, there is a curious contrivance of the nectary, in the form of a cylinder, which does not exist in the female flower.

Son.—Are not many flowers very remarkable for their nectaries ?

Father.—In the *Devil in the Bush* (*Nigella*), the nectaries are placed in a circle round the five pistillas, and these consist of two cups together, with a common covering to both apertures. In the *Christmas Rose* (*Helleborus Niger*), they appear like a circle of little pitchers, and the nectaries of the flowers of the *Mignonette* (*Reseda odorata*), are also of most curious and elegant construction, being two fringed petals growing close together, so as to form a little casket, or box, the lid of which is a small scale betwixt the stamens and petals, and pressing so closely on the latter, as to shut up securely a small drop of honey in the hollow formed by their union; and bees may be frequently seen baffled in their attempts to plunder this honey, not being able to open the lids sufficiently wide to allow of the insertion of their trunks.

Son.—Do not some of these appear like a cornucopia, or spur?

Father.—Yes; as in the *Indian Cress* (*Tropæolum*), and *Red Valerian* (*Valeriana Dioica*), and the *Common Lark-spur* (*Delphinium*); but the most remarkable of these is the *Columbine* (*Aquilegia*), where the five nectaries very much resemble a nest of young doves.

Son.—Are not some nectaries curiously concealed from insects?

Father.—Yes; as in the several species of *Passion-flower*, and in the *Monkshood* (*Aconitum Napellus*), the two nectaries are placed upon a pillar (pedicelled), and on these are the figure of two dolphins, which are concealed under the upper petal of the Corolla.

Son.—Do these contain honey?

Father.—If you bite one of the dolphin-appearances, you will find it taste very sweet.

Son.—As this is a poisonous plant, can the honey partake of the nature of the plant?

Father.—Honey formed, where the Pontic Rhododendron, Rose-bay, Kalmias, &c. are common, is found to be of a poisonous nature.

Son.—Where is the nectary in the Rhododendron?

Father.—A groove in the upper petal, where you may often observe a large drop of honey.

Son.—Are there any other plants where the honey is curiously concealed?

Father.—Yes; for the orchis and óphrys family contains several species, which resemble a variety of insects, the Nectary being the principal feature in their different forms; sometimes their flower resembles a gnat, a butterfly, a bee, a fly, or a bird: the Nectary of the *bee-óphrys* is a large thick leaf of a sooty colour, and when seen in the light, seems varied with three bright yellow circular lines, with rust-coloured spaces between them, and so exactly represents a drone, or bee, that it might be mistaken for them. The flowers of the *Cypripedium* are supposed to resemble the form of a lady's slipper; and hence the plant has acquired it's name.

Son.—What intention can Nature have in thus creating plants so very much to resemble living creatures?

Father.—With a view to excite our wonder, and probably, as a means of concealment from insects and birds.

Son.—I wish a further explanation of this.

Father.—The colour of insects and many smaller animals contributes to conceal them from the larger ones which prey upon them. Caterpillars which feed on leaves are generally

green; and earth-worms the colour of the earth which they inhabit; butterflies which frequent flowers are coloured like them; small birds which frequent hedges have greenish backs like the leaves, and light coloured bellies like the sky, and are hence less visible to the hawk, who passes under or over them. Those birds which are much amongst flowers, as the goldfinch (*Fringilla Carduelis*), are furnished with vivid colours. The lark, partridge, and hare, are the colour of dry vegetables, or the earth on which they rest. Frogs vary their colour with the mud of the streams which they frequent; and those which live on trees are green. Fish, which are always suspended in water, and swallows, which are generally suspended in air, have their backs the colour of the distant ground, and their bellies of the sky. In the colder climates many animals become white, especially hares, during the existence of the snows.

Son.—I have somewhere read of plants catching flies.

Father.—We have a most remarkable instance of this in the *Dionæa Muscipula*, *Venus's Catch-fly*, which has its leaves armed each way with a trap, as completely constructed as a rat-trap, and much resembling it, distinct from the radical leaves. When any

insect approaches to rob the flower of its honey, as soon as they pass on this trap, it closes, and interlacing its spines, holds the insect so firm, as to crush it to death.

Son.—Where does this wonderful plant come from?

Father.—From North America, where it grows on boggy land.

Son.—Have we any plant in our own country, which in the least resembles this?

Father.—Yes, we have the *Sun-dew* (*Drosera*), whose round flat leaves are thickly beset with hairs, both on the upper surface and the margin; and each of these hairs is crowned with a little purple globule, which, in the sun-shine, exudes a pellucid drop of a mucilaginous nature, which gives this part the appearance of being covered with dew-drops, and in these the fly is completely entangled, and can advance no further, but is caught as with bird-lime.

Son.—Where are these plants to be found?

Father.—In our marshes, and the wet parts of heaths.

Son.—Are there any other flowers which defend their nectaries?

Father.—In the *Apocynum Androsæmifolium*, one kind of Dog's-bane, the anthers converge over the nectaries, which consist of five glan-

dular oval corpuscles surrounding the germ; and at the same time admit air to the nectaries at the interstice between each anther. But when a fly inserts its proboscis between these anthers to plunder the honey, they converge closer, and with such violence as to detain the fly, which thus generally perishes.

Son.—I see Nature is great in all her works, and we must acknowledge a supreme power exerted even in the simple mechanism of a plant.

Father.—As the philosopher, who was cast away, and saw geometrical figures on the sand, cried out, “inhabitants are here,” so the more we shall inquire into the works of Nature, the more reason shall we have to declare, “that a God is here,” and to be seen, “in these, his lowest works.”

Son.—I think you said that part of the flowers, which did not secrete any honey, was also called the Nectary.

Father.—In the flower of the *Grass of Parnassus* (*Parnassia*) there are five glandular bodies beset with hairs, upon the extremities of each are placed small globules, so that this part looks like so many camel-hair pencils. This part, as being neither Calyx, Corolla, Stamina, or Pistillum, is called by Linnæus the Nectary.

Son.—I have observed a scale at the base of each petal of the Butter-cup (*Ranunculus*).

Father.—This is called the Nectary, and it distinguishes this flower from the Flos Adonis, or Bird's-eye.

Son.—Can you furnish me with any other example?

Father.—In the *Fraxinella* (*Dictamnus*) the stamens are all studded with little glands, which constitute the Nectary, but it is probable, that these only contain resinous matter, which abounds about the stalk, so that upon a still evening, the exhalation has been set on fire by lightning, and produced a blaze of sudden fire about the plant, as has been observed by the daughter of Linnæus, and others.

Son.—Will you favour me, as before, with a recapitulation?

Father.—I will.

RECAPITULATION.

THE term NECTARY, like the COROLLA, is also a complex idea, like our words pigeon, dog, made up of many different individuals, indeed too numerous and diversified to be distributed under heads, for every singular appearance in different parts of the flower, even unconnected with the corolla, whatever is

not calyx, or stamen, or pistillum, or corolla, whether it secretes honey, or not, is called by Botanists, the NECTARY.

The following are amongst the most prominent examples:—

- I. A SPUR, OR HORN (*Nect. corniculatum*), as in Lark-spur.
- II. A SMALL OPEN CUP (*Cyathus apertus*), small hollow cups, circularly ranged in the interior of the flower, as in Hellebore.
- III. A CUP CLOSED BY A LID (*Cyathus clausus*), a similar arrangement of nectaries, as in the preceding, but closed with a lid, as in the Devil in the Bush.
- IV. LIKE THE CUT FINGER OF A GLOVE (*Nect. companulatum*), hollowed like the finger of a glove cut off, but depending, as in the Rhenealmia.
- V. LIKE A FUNNEL, upright (*Nect. Infundibuliforme*), as in the Narcissus.
- VI. LIKE A SLIPPER (*Nect. calceiforme*), as Lady's Slipper.
- VII. A SIMPLE CAVITY (*Forca excavata*), an excavation at the base of each petal, as in Fritilaria.
- VIII. A NAKED CHANNEL (*Linea longitudinalis excavata*), an hollow longitudinal

groove, in a petal, as in the Martagon Lily.

- IX. VILLOUS PROJECTIONS** (*Nect. barbatum*), numerous villi placed upon the petal, as in the Iris.
- X. FILAMENTS WITHOUT ANTHERS, IMITATING STAMINA** (*Filamenta sine antheris, veluti stamina*), filiform projections like stamina, each terminated with a clasper, as in the Arum.
- XI. PETAL-LIKE** (*Nec. petulam mentiens*), as in the Violet.
- XII. RESEMBLING A NEST OF DOVES** (*Columbulos referens*), five cornuted nectaries, the whole resembling much a nest of doves, as the Columbine.
- XIII. RESEMBLING DOLPHINS** (*Figuram Delphini representans*), like a dolphin elevated on a pillar or filament, as the Aconite.
- XIV. LIKE A TONGUE** (*Veluti lingua*), as in Canna Indica.
- XV. RESEMBLING RAYS OF GLORY** (*Filamenta versicolorata in orbem posita*), projections in the form of rays of glory, as in the Passion flower.
- XVI. GIVING THE APPEARANCE OF VARIOUS ANIMALS** (*Nect. formam animalium mentiens*), as the Orchises.

- XVII.** A NAKED SCALE (*Squama nuda*), as in the *Ranunculus*.
- XVIII.** A FRINGED SCALE (*Squama fimbriata*), as the *Parnassia*.
- XIX.** GLANDS UPON THE STAMENS (*Glandulæ filamentis adpersæ*), as in *Fraxinella*.
- XX.** GLANDS AT THE INSERTION OF STAMENS (*Glandulæ filamentis positæ*), as in Stocks, and other Cruciform plants.

Son.—What use has Linnæus made of the Nectary?

Father.—As a distinguishing character of several of the Genera.

SEVENTH CONVERSATION.

ON THE SEXUAL SYSTEM OF LINNÆUS.

Son.—I FEEL a greater love for Botany, as I advance in the Science, and I hope I remember what you said in our preceding conversation.

Father.—We shall soon apply some part of our former knowledge, which is the key to all the several Systems of Botany.

Son.—What, are there other systems of Botany than that of Linnæus?

Father.—Several; for previous to the time of LINNÆUS, NEHEMIAH GREW, an Englishman, flourished; a very eminent physiologist, who consulted not books, but Nature, and wrote his "*Vegetable Anatomy*," in 1682. In this work he mentions the *Sexes of Plants*, relating a conversation he held on the subject, with Sir THOMAS MILLINGTON, Savilian Professor of Natural History at Oxford, and President of the Royal London College of Physicians. SEBASTIAN VAILLANT also wrote "*A Discourse on the Structure of Flowers*," confirming the doctrine of the *Sexes of Plants*, which LINNÆUS acknowledges to have read, and which might have laid the foundation of

his building up a System on this important discovery. **TOURNEFORT** also flourished before the period of **LINNÆUS**, and his fame procured him, in 1683, the appointment of Botanic Professor in the King's Garden. At the expense of the King of France, he travelled over all the countries of Europe, in pursuit of plants, and spent three years in the Levant. His glory is, to have formed a *System*, beautiful in itself, but suited to a limited knowledge of plants, which could then be accommodated to such a system; and to have invented the method of forming plants into their respective *Genera*, since perfected by **LINNÆUS**. His "*Elements of Botany*" evince a vast knowledge of the genera and the species of plants, and this botanical work is one of which the French are, even to the present day, passionately fond. He rose to be president of the Faculty at Paris. This illustrious Botanist was born in 1656, and died in 1707, the same year that **LINNÆUS** came into the world.

RAY was the contemporary of **TOURNEFORT**, somewhat prior, being born in 1628; from his studies at Cambridge, his health declined, and he was obliged, for its recovery, to go much into the fields. In these excursions, plants naturally presented themselves, and he hence became enamoured of the science of Bo-

tany. He first published a "*Catalogue of the Plants growing about Cambridge.*" Travelling abroad, his vast mind collected a knowledge of various plants, and, like TOURNEFORT, he wished to dispose these into a Method, and invented a celebrated "*System,*" more perfect than that of TOURNEFORT, but less simple and practical than that of LINNÆUS; and arranged under his own System, the "*Historia Plantarum,*" "A History of Plants," in three large folio volumes, being a description of all the species of plants known at that period.

Son.—I should feel much obliged by your giving me, in short, some account of LINNÆUS.

Father.—The botanical world found the chaotic mass somewhat removed by these illustrious men: but still the Science of Botany was of difficult attainment, and many new plants could not be reduced to the Systems of either TOURNEFORT or RAY, when LINNÆUS turned his attention to this science. He soon became the pride and wonder of the age! Like the sun, when he flourished, all preceding botanists hid their diminished heads, and are now only read to know the state of natural science before the period of LINNÆUS! He ranged throughout every path of Nature, and left nothing unattempted or unaccomplished! He may be truly said to have lived, if life is to be

computed by acquisitions, for he saw and described more than others had seen and done in a thousand years, and each day with him appears, from his gigantic achievements, an age! He introduced truth, order, precision, and perfection, into Natural History! He borrowed from none, his labours are all original! Attacked by numerous and rancorous adversaries, who cowardly and morosely addressed the prejudices of the vulgar against him, he only retorted by embellishing his portrait with a monkey teasing a bear, in allusion to their characters, and sensible of his own. His "*Sexual System*" first proved his uncommon genius. His "*Philosophia Botanica*," "*Botanical Philosophy*," cleared away all the obscurities in Botany, and formed it into a science. His "*Genera Plantarum*," containing a full description of the minutest parts of each genus of plants, showed the most consummate patience, the nicest observation, and the greatest skill. His "*Species Plantarum*," and his "*Systema Naturæ*," "*Species of Plants*," and "*System of Nature*," evince not only such an acquaintance with all plants, as is truly astonishing, but also with all the wonderful works of God throughout Nature. His "*Travels*," and works on "*Medicine*," are only little considered from the superlative ex-

cellence of his other labours. He was honoured and encouraged by the patronage of the King and Queen of Sweden. Adored, beloved, honoured, LINNÆUS saw his darling pursuits advance with rapid steps, not only in Sweden, but throughout every country of Europe, and himself looked up to as the FATHER of NATURAL HISTORY. Pupils of his own choice, supported by his government, traversed the globe, and sent him its produce to arrange. When he died, in the year 1778, æt. 71, the KING OF SWEDEN, in his annual address, mentioned him as a public loss, and the university attended his funeral; there was also, on this occasion, a general mourning.

Son.—In what year did Linnæus introduce his *Sexual System*?

Father.—In 1731, he first published his Sexual method, æt. 24, and arranged according to it the Botanic Garden at Upsal.

Son.—Why is it called the *Sexual System*?

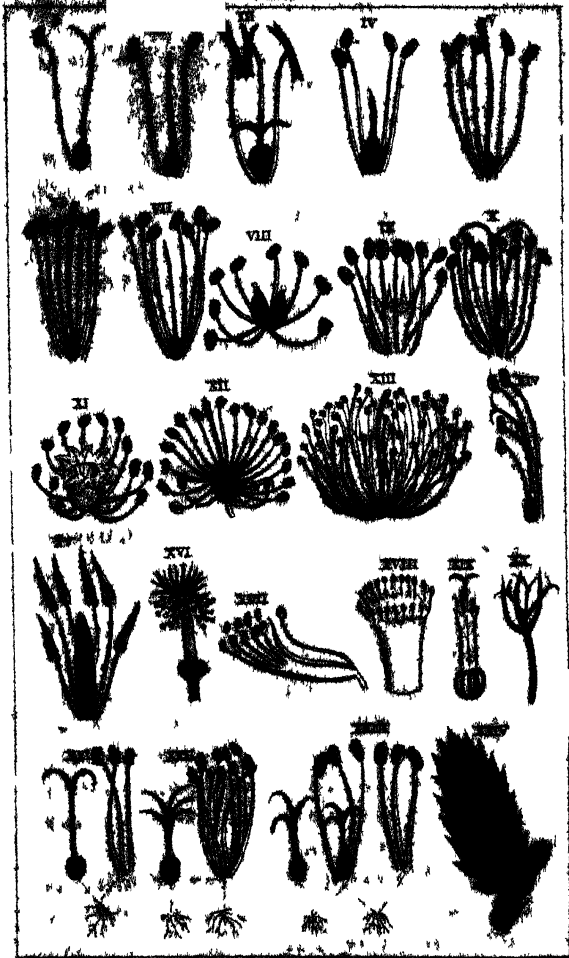
Father.—As being founded upon the consideration of the *Stamina* and *Pistilla* in plants.

Son.—What are the *Number* of his CLASSES?

Father.—Twenty-four; the precise number of letters in our alphabet.

Son.—What are the *Names* of the first thirteen CLASSES?

Classes



Classes of the floral parts of the flower



Classes of the Sexual System Illustrated by Flowers.

Father.—Linnæus has called the first thirteen classes of his sexual system as follows:—

CLASSES.

<i>Names.</i>	<i>Definitions.</i>
1. <i>Number of Stamens.</i>	
No.	
I. MONANDRIA.	One STAMEN.
II. DIANDRIA.	Two STAMINA.
III. TRIANDRIA.	Three STAMINA.
IV. TETRANDRIA.	Four STAMINA.
V. PENTANDRIA.	Five STAMINA.
VI. HEXANDRIA.	Six STAMINA.
VII. HEPTANDRIA.	Seven STAMINA.
VIII. OCTANDRIA.	Eight STAMINA.
IX. ENNEANDRIA.	Nine STAMINA.
X. DECANDRIA.	Ten STAMINA.
XI. DODECANDRIA.	Twelve to Nineteen STAMINA.
2. <i>Number, and Insertion.</i>	
XII. ICOSANDRIA.	{ Twenty or more STAMINA insert- ed on the CALYX, or COROLLA.
XIII. POLYANDRIA.	{ Twenty, or more STAMINA, on the RECEPTACLE.

Son.—I observe that all these *thirteen* classes end in *andria*, what does this word mean?

Father.—*Ανδρ*, *aner* genitive, *ανδρως*, *andros*, Greek, means *a man, an husband, a male*, which the *stamina* are esteemed to be.

Son.—What is the meaning of the words placed before *andria*?

Father.—They are *Greek Numerals*, frequently used in Botany; thus,

I. MON	from	μονος,	monos,	is one
II. DI		δισ,	dis,	two
III. TRI		τρεις,	treis,	three
IV. TETR		τεσσαρες,	tessares,	four
V. PENT		πεντε,	pente,	five
VI. HEX		εξ,	ex,	six
VII. HEPT		επτα,	epta,	seven
VIII. OCT		οκτω,	octo,	eight
IX. ENNE		εννεα,	ennea,	nine
X. DEC		δεκα,	deka,	ten
XI. DODEC		δωδεκα,	dodeka,	twelve
XII. ICOS		ικοσι,	ikosi,	twenty
XIII. POLY		πολυς,	polus,	many.

Son.—I should have liked this System better, unless for these hard words.

Father.—They will become familiar by use; are you frightened at the expressions, *tri-angle*, *pent-agon*, *hex-agon*, *oct-agon*, *poly-gon*, which often occur in common conversation?

Son.—I am not, and begin to be persuaded I am wrong.

Father.—How would you have relished the terms, had they been *Swedish*?

Son.—I should not have liked them half so well.

Father.—Besides, it was necessary to have an universal language amongst Botanists, which

could only be derived from the Greek or Latin.

Son.—I am now satisfied, but how am I to count the *Stamina*?

Father.—From the number of *Anthers*.

Son.—But should these *Anthers* be twin?

Father.—With botanists they go then only as for one.

Son.—Why not count the *filaments*?

Father.—Because some plants have *imperfect stamens*, that is, *filaments* without *anthers*, and these botanists have agreed not to reckon.

Son.—Favour me with an example.

Father.—In the *Sage* (*SALVIA*), there is an attempt towards *sour stamina*, but *two filaments* being without *anthers*, hence it arranges in the *second class DIANDRIA*.

Son.—I see how easy it is to understand the first *thirteen* classes; it is only like counting the fingers; *one, two, three*, and so on.

Father.—This is true, as regards the first *eleven* classes; they are solely guided by NUMBER.

Son.—I should have liked them better had I found the *Eleventh* class, containing 11 STAMINA.

—This was properly omitted by LINNÆUS as he knew of no flower in the world, having 11 STAMINA, which fell into such a class.

Son.—Why call the *eleventh* class DODECANDRIA, when there are 12, 13, 14, 15, 16, 17, 18, and 19 *stamina*, in the flowers?

Father.—After counting 12, the name of the class, it would be fatiguing to number up exactly, and the botanist, unless he finds a great many, is almost certain to hit upon this class, without much trouble.

Son.—Why not have made as *many classes* as there are *numbers of stamina*?

Father.—Because, as classification is only bringing a certain number of plants together, and separating these from the others, unless the number so collected had been very large, there could be no use for such a separation and multiplying of classes.

Son.—Why is ICOSANDRIA so called, unless this class contained really 20 *stamina*, and *no more*?

Father.—For the same reason as with DODECANDRIA, it is the name of an assemblage of plants, possessing more than nineteen *stamina* upon the *Calyx*, or *Corolla*. The name is immaterial if the definition be good.

Son.—Has the ICOSANDRIA class *usually* 20 *stamina*?

Father.—The *stamina* here are seldom counted, for they are better known by the in-

sertion of the FILAMENTS into the calyx or corolla.

Son.— Why not have called this class POLYANDRIA, as possessing *many stamina*, that is, *more than 19*?

Father.—The class POLYANDRIA, in that case, would have been a too numerous assemblage of plants.

Son.—Is there not another reason?

Father.—Yes; LINNÆUS, who was fond of preserving as much as possible the *natural families*, wished to include most of the *edible fruits* into this class.

Son — How has he accomplished this?

Father.—Unfortunately this class could not cover all, for the *Gooseberry* and *Currant* (RIBES), come under class V. PENTANDRIA; and the *Orange* (CITRUS), under class XVIII. POLYADELPHIA; yet it possesses most of the *edible fruits*, as the *Almond*, *Peach*, and *Nectarine*, the *Plum*, *Cherry*, *Apricot*, the *Medlar*, *Pear*, *Apple*, *Quince*, *Blackberry*, *Raspberry*, *Strawberry*, and *Hawthorn*.

Son.—Does not the class III. TRIANDRIA, contain most of the *Grasses*?

Father.—Not all; for the *Sweet Vernal Grass* (ANTHOXANTHUM), falls into the second class, DIANDRIA, and some few grasses into the other classes.

Son.—Has not *this* been objected to LINNÆUS?

Father.—Frequently. But his classification is more properly, only as a sort of dictionary, which follows according to the alphabet, and it is in vain to attempt uniting perfectly a *natural* with an *artificial* arrangement: it is enough that *most* of the *grasses* are in class III. TRIANDRIA.

Son.—What are contained in class V. PENTANDRIA?

Father.—The *umbellate* tribe of plants; also many others.

Son.—What flowers does class VII. HEXANDRIA, chiefly contain?

Father.—The *liliaceous* tribe of plants, the beaux and belles of the vegetable world.

Son.—What flowers does class VII. HEP- TANDRIA, contain?

Father.—It is remarkable as having the *Horse-chesnut*, *Æsculus Hippocastanus*, and *Septas*.

Son.—What the class XIII. POLYANDRIA?

Father.—The Poppy, and several other poisonous plants; so necessary is it to have this class separate from class XII. ICOSANDRIA.

Son.—I think I now understand well these *thirteen* classes, and would wish to know his definition of the other following classes.

Father.—LINNÆUS observed, that in *some*

flowers the STAMINA were not of the same height, and two were shorter than the others, and where *this* was the case, the flowers were LABIATE, or LIPPED; that is, either *ringent* or *personate*, (natural tribes), and *cruciform*, (another natural tribe).

Son.—Where these differences in the respective heights of the STAMINA are observed, must the flowers be of *the above three natural orders*?

Father.—Yes; and these classes are thus named by Linnæus, from the consideration of

3. *Number & Height.*

CLASSES.

<i>No.</i>	<i>Names.</i>	<i>DEFINITIONS.</i>
XIV.	DIDYNAMIA.	{ Two long STAMINA, two short, Lepped Flowers.
XV.	TETRADYNAMIA.	{ Four long STAMINA, two short, Cruciform.

Son.—What is the *derivation* of the NAMES of these classes?

Father.—From *dis*, *dis*, Greek, *two*, and *δυναμις*, *dunamis*, *power*, *height*, in the first case, two of the stamens being *longer* than the other two, thus ::; and in the second, four being longer than the other two, placed thus ::::, the first belonging to the LIPPED flowers, the latter to the CRUCIFORM.

Son.—When there are *four* stamens, I am then to examine into this circumstance.

Father.—Certainly; although class XIV. the DIDYNAMIA, consists entirely of *Ringent* or *Personate* flowers; yet as there are some few exceptions, falling into Class II. this must be examined into.

Son.—When there are *six stamina*, am I also carefully to examine the respective heights of these, if the flowers be *Cruciform*?

Father.—There is no great difficulty here, as all the *Cruciform* fall into Class XV. TETRADYNAMIA, and such classes give a grace to the System, when possessing the natural tribes.

Son.—What are the next classes?

Father.—These are derived from the consideration of the UNION OF THE FILAMENTS, and are thus named:—

4. Union of Filaments.

CLASSES.		DEFINITION.
No.	Names.	
XVI.	MONADELPHIA.	{ Filaments united at the bottom into <i>one</i> Body.
XVII.	DIADELPHIA.	{ Filaments united at the bottom into <i>two</i> Bodies. Flowers Papilionaceous.
XVIII.	POLYADELPHIA.	{ Filaments united at the bottom into <i>three</i> or <i>more</i> Bodies.

Son.—What is the origin of these names?

Father.—They are from Greek extraction,

αδελφος, adelphos, means a *brother*, and there appears a sort of league, as it were, amongst these stamina, a kindred appearance.

Son.—Is it not a very curious circumstance, this interlacement of filaments?

Father.—It is nothing more than what you see in the distinction of *water* from *other fowls*, the one is *web-footed*, the *other not*.

Son.—Oh! I now catch the idea, and shall notice this curious distinction.

Father.—The class XVI. MONADELPHIA, is derived from μονος, monos, *one*, and αδελφος, a *brother*, and possesses not a *natural tribe* of plants. It contains however the Mallows (Malva), and Crane's-bill (Geranium).

Son.—Does Class XVII. DIADELPHIA, contain a *natural tribe* of plants?

Father.—Completely so, as it is formed of the *papilionaceous* flowers.

Son.—I feel now the advantage of regularly studying Botany, as I know well what a *papilionaceous flower* means from a former conversation. What is the origin of the term DIADELPHIA?

Father.—From δισ, dis, *two*, and αδελφος, adelphos, a *brother*; because generally the FILAMENTS are all united but ONE, which

readily separates from the rest, and as the germen swells when enlarging to become a legume, stands out single, wide apart from the rest.

Son.—Is this separation into *two parts* found to be *universally the case*?

Father.—No, for one of the subdivisions in Linnæus's work is into such as have *monadelphous filaments*, of which he numbers 29 genera.

Son.—Am I to look for the *classical character* to discover class XVII. DIADELPHIA?

Father.—The flowers being all *papilionaceous*, this appearance is enough, and as the major part have the true classical character, it was fair enough to put *all* the papilionaceous flowers into this class.

Son.—Do we often find LINNÆUS departing from his *artificial method*?

Father.—Only in this *one instance*, for some of the *Ringent* flowers are in class II. DIANDRIA, and the *Grasses* are dispersed into many of the classes, and the *Orange* and *Gooseberry* do not fall into the class XII. ICOSANDRIA, so that *his system* in other instances is purely *artificial*, like a *dictionary*.

Son.—What is the definition of class XVIII. POLYADELPHIA?

Father.—It is derived from the Greek words, πολυς, *polus*, *many*, and αδελφος, a *brother*; and

here the FILAMENTS at their base are *connected* into *three*, or *more bundles*.

Son.—What do they resemble ?

Father.—The stamina appear like so many camel's-hair pencils.

Son.—Is this union into bundles always very perceptible at first view ?

Father.—In the *St. John's-wort*, (*HYPERICUM*) the flower appears at first view to belong to the class XIII. *POLYANDRIA*; but the stamens fall off, or may be separated into *three* bundles, connected together at the base. The *Orange* has 20 stamina formed into a *great* number of bundles, the *Melaleuca* more, and the *Chocolate-nut*, (*THEOBROMA*) has five stamina, or rather five bundles of stamina, since *each filament* supports *five anthers* at top.

Son.—As the flowers of the classes *MONADELPHIA* and *POLYADELPHIA* do not possess a *natural tribe of flowers*, is it not possible to mistake these for some of the former classes of numbers only ?

Father.—A little care will prevent this, nothing is attained without some trouble.

Son.—We come now to the 19th class.

5. *Union of Anthers.*

CLASS.

<i>No.</i>	<i>Names.</i>	<i>DEFINITION.</i>
XIX.	SYNGENESIA.	5. United anthers. Flowers compound.

Father.—Here we have instead of the filaments, the ANTHEERS UNITED.

Son.—What is the derivation of this word?

Father.—From $\sigma\upsilon\nu$, sun, together, and $\gamma\epsilon\upsilon\epsilon\sigma\iota\varsigma$, genesis, birth.

Son.—What does this mean?

Father.—They resemble an united family.

Son.—This then is the reverse of the *Mono-Di-* and *Poly-adelphous*, flowers.

Father.—Yes; and what is very pleasing, this class contains all the *compound* flowers.

Son.—I am glad of this, for like the *papilionaceous* flowers, I shall at once know the class by seeing the flower without the trouble to examine it.

Father.—I am sorry to hear you use the word trouble, for nothing great or good is attained without trouble, and here the parts are so minute, as *almost* to require a glass.

Son.—Did not LINNÆUS employ a magnifying glass, or pocket microscope in his examination of plants, he has so admirably described?

Father.—By no means, his vision was so very acute; and so will yours by a little practice; for the bodily organs, as well as the mind, are greatly improved by the study of Botany.

Son.—Are not the orders of this class somewhat difficult to understand?

Father.—Yes, they are; but this is not the

time to speak of them. Let us now proceed to class XX.

6. *Position of Stamens.*

CLASS.		
No.	Name.	DEFINITION.
XX.	GYANDRIA.	STAMENS growing out of the PISTILLUM, or fixed upon an elongated RECEPTACLE.

Son.—What is the derivation of this word?

Father.—LINNÆUS observing the varieties of the stamina, upon which he founded his system, noticed that in the generality of flowers, the stamina took their origin, or were affixed to the calyx, corolla, or receptacle; but here the stamens grow out of the *Pistillum*, or are seated on an *elongated receptacle* or pillar, which resembles a style, hence called by him GYNANDRIA, from γυνή, *gune*, a woman, and ανηρ, *aner*, a man.

Son.—Do the flowers in this class belong to any natural order?

Father.—No; but they possess a most curious appearance, which arises from the position of the stamens and pistils being differently placed from all other flowers.

Son.—Do not *Orchises* belong to this class?

Father.—Yes, they do, and in them the germen is contorted, or as if twisted by the hand; on the top issue two hoods, within which

are the *two stamina*, here originating from the *Pistillum*.

Son.—Are not many of the plants in this class remarkable for their beautiful *nectaries*?

Father.—Extremely so; especially the *Orchises*, the *Passion-flower*, and *Ferraria Tigrida*, Tiger *Ferraria*, and *Limodorum*.

Son.—How is the *nectary* of the *Arum*?

Father.—A false appearance of filaments without anthers.

Son.—Will you explain to me the classes XXI. and XXII.?

Father.—These are

7. Separation.

CLASSES.

<i>No.</i> <i>Names.</i>	<i>DEFINITION.</i>
XXI. MON-ŒCIA.	{ <i>Stamens</i> and <i>Pistils</i> in <i>separate</i> corollas, upon the <i>same</i> Plants.
XXII. DICECIA.	
XXIII. POLYGAMIA.	{ <i>Stamens</i> and <i>Pistils</i> in <i>separate</i> corollas, upon <i>different</i> Plant. Of the same kind— <i>Unisexual</i> and <i>Bisexual</i> flowers upon the <i>same</i> plant, or <i>different</i> plants of the same kind.

Son.—What are the characteristic signs of these two classes?

Father.—In the examination of the diversity of *stamina*, LINNÆUS could not fail to observe

that some flowers were wholly composed of stamina; these he called *Staminiferous* flowers, and these always possess corresponding *Pistilliferous* flowers, or flowers only bearing Pistillas, which were either *in the same plant*, or *on different plants of the same kind*; accordingly he formed his classes from SEPARATION, class XXI. MONÆCIA, from *μῶδος*, *one*, and *οἰκία*, *oikia*, *an house*, or *habitation*, class XXII. DIÆCIA, from *δῖς*, *dis*, *two*, and *οἰκία*, *oikia*, *an habitation*, where they dwell upon different plants; and class XXIII. POLYGAMIA, from *πολύς*, *many*, and *γάμος*, *gamos*, *marriages*, where along with *unisexual* are found some *bisexual* flowers.

Son.—I see now the necessity of speaking about the *sexes of plants* for the full explanation and comprehension of this system.

Father.—The last class XXIV. in Linnæus is CRYPTOGAMIA.

3. *Concealment.*

CLASS.

<i>No.</i>	<i>Name.</i>	DEFINITION.
XXIV.	CRYPTOGAMIA	STAMENS and PISTILS invisible.

Son.—Will you kindly *recapitulate* the whole.

Father.—I will, and must entreat the student to commit this page to memory, as he would

his pence, or multiplication table, if he has any wish to become a botanist.

RECAPITULATION.

(To be committed to memory.)

CLASSES OF THE SEXUAL SYSTEM.

CLASSES.

CLASSES.

1. Number of Stamens only.

<i>No.</i>	<i>Names.</i>	<i>DEFINITIONS.</i>
I.	MON-ANDRIA.	One STAMEN.
II.	DI-ANDRIA.	Two STAMINA.
III.	TRI-ANDRIA.	Three STAMINA.
IV.	TETR-ANDRIA.	Four STAMINA.
V.	PENT-ANDRIA.	Five STAMINA.
VI.	HEX-ANDRIA.	Six STAMINA.
VII.	HEPT-ANDRIA.	Seven STAMINA.
VIII.	OCT-ANDRIA.	Eight STAMINA.
IX.	ENNE-ANDRIA.	Nine STAMINA.
X.	DEC-ANDRIA.	Ten STAMINA.
XI.	DODEC-ANDRIA.	{ Twelve to Nineteen STAMINA.

2. Number & Insertion.

XII.	ICOS-ANDRIA.	{ Twenty or more STA- MINA inserted on the CALXY, OF COROLLA.
XIII.	POLY-ANDRIA.	{ Twenty, or more STA- MINA on the RECEPTACLE.

3. Number & Height.

XIV.	DI-DYNAMIA	{ Two long STAMINA, two
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XV. TETRA-DYNAMIA. { *Four long STAMINA,
two short.*

4. Union of Filaments.

XVI. MONA-DELPHIA. { *FILAMENTS united at
the bottom into
one Body.*

XVII. DIA-DELPHIA. { *FILAMENTS united at
the bottom into
two Bodies.*

XVIII. POLYA-DELPHIA. { *FILAMENTS united at
the bottom into
three or more Bodies.*

5. Union of Anthers.

XIX. SYN-GENESIA. *Five united ANTERS.*

6. Position of Stamens.

XX. GYN-ANDRIA. { *STAMENS growing out
of the PISTIL, or an
elongated RECEPTA-
CLE.*

7. Separation of Sexes.

XXI. MON-ŒCIA. { *STAMENS and PISTILS
in separate COROL-
LAS, upon the same
Plant.*

XXII. DI-ŒCIA. { *STAMENS and PISTILS
in separate COROL-
LAS, upon different
Plants.*

8. Polygamy.

XXIII. POLY-GAMIA. { *Bisexual and unisexual
FLOWERS.*

9. Concealment.

XXIV. CRYPTO-GAMIA. { *STAMENS and PISTILS
invisible.*

EIGHTH CONVERSATION.

ON THE ORDERS OF PLANTS.

Son.—As you lead me on *step by step*, I begin now to get very fond of Botany.

Father.—I am glad of it, for all persons should delight in knowledge.

Son.—I also begin to see how intelligent man is, and I feel a great veneration for *the father of modern Botany*, LINNÆUS. How has he formed the ORDERS to his ingenious system?

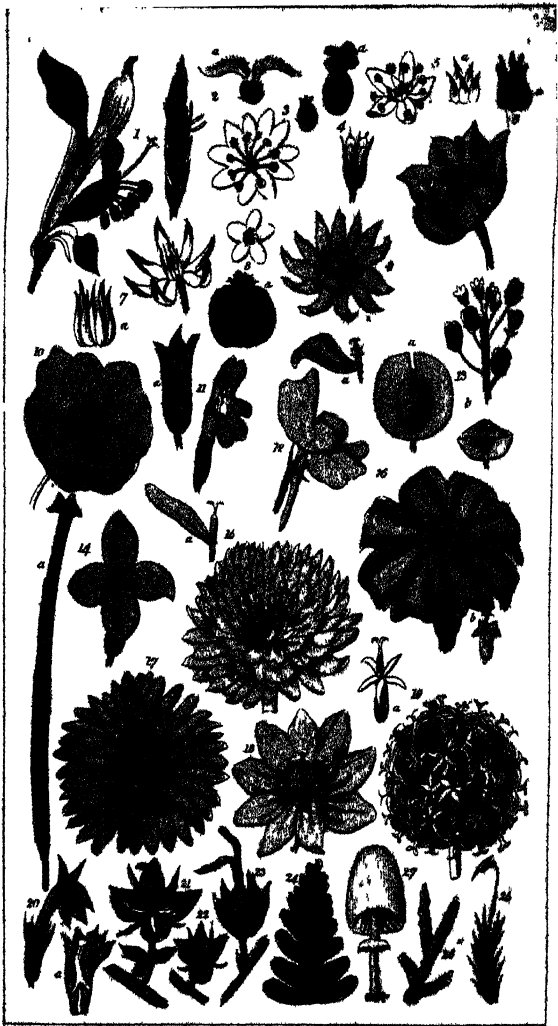
Father.—You should first inquire what the word *order* means.

Son.—I would then thank you to explain this?

Father.—ORDER means, *arrangement, division*. Thus, an army is placed in *order*, BOOKS are placed in *order, arranged*, and an ARMY is divided into regiments, these into battalions, and so on.

Son.—Does not geography also shew this?

Father.—Thus ENGLAND is divided into *Counties*, these into *Parishes*, and so on.



ORDER THEN IS THE DIVISION OF A CLASS.

Son.—How has Linnæus divided, by *orders*, his first *thirteen* CLASSES?

Father.—Please to repeat the names of these *thirteen* first CLASSES.

Son.—I. MONANDRIA. II. DIANDRIA. III. TRIANDRIA. IV. TETRANDRIA. V. PENTANDRIA. VI. HEXANDRIA. VII. HEPTANDRIA. VIII. OCTANDRIA. IX. ENNEANDRIA. X. DECANDRIA. XI. DODECANDRIA. XII. ICOSANDRIA. XIII. POLYANDRIA.

Father.—I find you *recollect* them *well*. He has formed the ORDERS of these from the *number* of PISTILLA.

Son.—What words does he use to express this idea?

Father.—As the word *ανηρ*, *aner*, means a *mâle*, the corresponding word *γυνή*, *gune*, means in Greek, a *female*. The Greek numerals you recollect, which he has here repeated, expressive of the *number* of PISTILLA.—Thus,

No.	ORDERS,	
I.	is MONO-GYNIA	1 <i>Pistillum.</i>
II.	DI-GYNIA	2 <i>Pistilla.</i>
III.	TRI-GYNIA	3 <i>Pistilla.</i>
IV.	TETRA-GYNIA	4 <i>Pistilla.</i>

V.	PENTE-GYNIA	5 <i>Pistilla.</i>
VI.	HEXA-GYNIA	6 <i>Pistilla.</i>
VII.	HEPTA-GYNIA	7 <i>Pistilla.</i>
VIII.	OCTO-GYNIA	8 <i>Pistilla.</i>
IX.	ENNEA-GYNIA	9 <i>Pistilla.</i>
X.	DECA-GYNIA	10 <i>Pistilla.</i>
XI.	DODECA-GYNIA	11 <i>Pistilla.</i>
XII.	POLY-GYNIA	Many <i>Pistilla.</i>

Son.—The orders here are very easy, depending solely upon counting, like the stamina; but is it the stigma, style, or the whole pistillum, that we are to reckon?

Father.—We reckon the *styles* only, where this part exists, the stigmas being often obscure.

Son.—Why not reckon the whole pistillum?

Father.—Because, often upon the *Germen*, which appears only *one*, may be seated *two*, or *more styles*, as in the *grasses*, *carnation*, and *passion-flower*.

Son.—This I now comprehend, please to go on to the other classes and orders.

Father.—Do you recollect the *fourteenth* class?

Son.—Yes, I do. The *fourteenth* CLASS is XIV. DIDYNAMIA, two *long* STAMENS and two *short*.

Father.—Do you remember what kind of flowers these possessed?

Son.—Perfectly. The *ringent* and *personate*.

Father.—All the *ringent* flowers have four *naked seeds* in the calyxes. Hence order I. *gymno-spermia*.

Son.—I understand what a *naked seed* means, being a seed devoid of pericarp.

Father.—The calyx closing upon such seeds, serves the office of a pericarp.

Son.—How is it with the *personate* flowers?

Father.—All these flowers have, on the contrary, their seeds *capsuled*. Hence order II. *angio-spermia*.

Son.—These distinctions are certainly obvious. But, could not LINNÆUS here have made his orders from the number of PISTILLA?

Father.—This would not have afforded him any division in the least, as these flowers have each only one Pistillum?

Son.—What is the derivation of the word *gymno-spermia*?

Father.—From the Greek words γυμνος, *gymnos*, *naked*, and σπέρμα, *spermia*, *a seed*.

Son.—What is the derivation of the word, *angio-spermia*?

Father.—From αγγος, *angos*, *a vessel*, and σπέρμα, *spermia*, *seed*.

Son.—Do these orders furnish any other advantage?

Father.—They divide this class into two per-

fectly *Natural Orders*, and as the class is but small, these two orders are here a sufficient division.

Son.—How are the orders of the *fifteenth CLASS, XV. TETRADYNAMIA*?

Father.—Do you recollect it possesses a *Natural tribe* of plants?

Son.—Yes! the *cruciform* tribe of plants.

Father.—Right, and as these all have but *one pistillum*, Linnæus was obliged here likewise to have recourse to the *seed-vessel*.

Son.—How has he done this?

Father.—He has divided this class into two orders, from the respective *forms* of the pericarp, or seed-vessel.

Son.—Please to explain this.

Father.—The first order of Class XV. TETRADYNAMIA, is order I. SILICULOSA, *pod a silicle*. Do you recollect what a *silicle* means?

Son.—Oh, yes! the pod here is broader than long, usually round, and generally very small. I again make use of the former knowledge I have acquired, and recollect your conversation on the different kinds of pericarps.

Father.—*Silicle* is derived from the Latin word, SILICULA, *a little pod*, all words in *cle*, are expressive of diminutiveness, so our word, *icicle*, a small piece of ice, and the botanical word, *radicle*, a little root.

Son.—Order II. SILIQUOSA means *pod*, a *siliqua*.

Father.—SILIQUA is the Latin word for a pod, without any expression as to size, and is used in *contradistinction* to *silicula*.

Son.—Could not LINNÆUS, in these two last classes, have made use of number for his orders?

Father.—This was impracticable, as they possess only one pistillum, but so far a pleasing uniformity prevails; the *classes* depending upon some consideration of the STAMINA, and the *orders* on the different circumstances respecting the PISTILLA.

Son.—I hope this natural kind of proceeding is continued.

Father.—If it does not appear, the reason will be assigned.

Son.—How are the orders of the next three classes formed?

Father.—Do you recollect these classes? They are derived, you remember, from the consideration of the union of the filaments.

Son.—When the filaments are webbed.

Father.—Please to repeat the names.

Son.—Class XVI. MONADELPHIA. XVII. DIADELPHIA. XVIII. POLYADELPHIA.

Father.—Do any of these contain a natural tribe of plants?

Son.—Yes, class XVII. DIADELPHIA, possessed the *papilionaceous* flowers. But I am

all eagerness to know how the several orders are constructed to these classes.

Father.—They are derived from *the number* of STAMINA, in fact, they possess the same names as those classes, which begin the system, thus:—

ORDERS.

<i>No.</i>	<i>Names.</i>	
I.	MONANDRIA	1 <i>Stamen.</i>
II.	DIANDRIA	2 <i>Stamina.</i>
III.	TRIANDRIA	3 <i>Stamina.</i>
IV.	TETRANDRIA	4 <i>Stamina.</i>
V.	PENTANDRIA	5 <i>Stamina.</i>
VI.	HEXANDRIA	6 <i>Stamina.</i>
VII.	HEPTANDRIA	7 <i>Stamina.</i>
VIII.	OCTANDRIA	8 <i>Stamina.</i>
IX.	ENNEANDRIA	9 <i>Stamina.</i>
X.	DECANDRIA	10 <i>Stamina.</i>
XI.	ENDECANDRIA	11 <i>Stamina.</i>
XII.	DODECANDRIA	12 to 19 <i>Stamina.</i>
XIII.	ICOSANDRIA and	} 20 or more <i>Stamina,</i> on the <i>Calyx.</i>
XIV.	POLYANDRIA.	
		} many on <i>Stamina,</i> the <i>Receptacle.</i>

Son.—Why not here make use of the number of pistillas, or the seed-vessel, or seeds, as before?

Father.—These would have generally furnished *very bad* divisions of these classes, and in the class XVII. DIADELPHIA, *none at all,*

as the *papilionaceous* flowers have but *one pistillum*, whereas they vary much in the number of *Stamina*.

Son.—Please to explain this further.

Father.—Let us first enumerate the orders of class XVI. MONADELPHIA.

IT HAS FIVE ORDERS.

No.	Names.	DEFINITION.	Examples.
I.	PENTANDRIA	having 5 <i>Stamina</i>	as HERMANNIA
II.	DECANDRIA	10 <i>Stamina</i>	GERANIUM
III.	ENDECANDRIA	11 <i>Stamina</i>	BROWNEA
IV.	DODECANDRIA	12 <i>Stamina</i>	PENTA PETES
V.	POLYANDRIA	many <i>Stamina</i>	MALVA.

Son.—I thought no plant had *eleven* *Stamina*.

Father.—None that fall into the first classes of number only. But here is an exception, as it regards the *Brotherhood* flowers, viz. the class XV. MONADELPHIA. We will next speak of class XVII. DIADELPHIA.

IT HAS ONLY FOUR ORDERS.

No.	Names.	DEFINITION.	Examples.
I.	PENTANDRIA	having 5 <i>Stamina</i>	as MONNIERIA
II.	HEXANDRIA	6 <i>Stamina</i>	FUMARIA
III.	OCTANDRIA	8 <i>Stamina</i>	POLYGALA
IV.	DECANDRIA	10 <i>Stamina</i>	PIRUMPE.

Father.—This makes *four* proper divisions of this class, whereas the *Pistillas* would have afforded none.

—I acquiesce in the reason.

Father.—As this arrangement is designed to serve only as a Dictionary, the beauty of association is less regarded than the facility of using such a system to find out the names of plants.

Son.—Here we are agreed, but at first sight I did not like the same words occurring as Orders, which were before used as Classes.

Father.—You confess, however, that as the union of filaments supersedes the flowers, where this does not occur, that the Orders could not be framed in any other better way.

Son.—Agreed; please to go on.

Father.—The class XVIII. POLYADELPHIA, contains four orders:

<i>No.</i>	<i>Names.</i>	<i>Definition.</i>	<i>Examples.</i>
I.	PENTANDRIA	having 5 <i>Stamina</i>	THEBROBIA
II.	DODECANDRIA	12 <i>Stamina</i>	MONSONIA
III.	ICOSANDRIA	{ 20 or more <i>Stamina</i> on the Calyx }	{ CITRUS, Orange.
IV.	POLYANDRIA	{ 20 or more <i>Stamina</i> on the Recep- tacle }	{ HYPERICUM, St. John's Wort.

Son.—I should have liked to have seen CITRUS, the orange, lemon, and gourd, in the same class, as the pear, apple, peach, &c.

Father.—So would Linnæus; but as he professes his System is only meant to facilitate a knowledge of plants, this could not happen, as respects the *orange*, also the *gooseberry*, &c. his being purely an *artificial* arrangement.

Son.—I see now the use of his System, made more for practice than for show.

Father.—It will be of this use, that with his book in our hand, of only sixty pages, you will be enabled, at once, without a master or guide, to discover the name of any unknown plant you may hold in your hand.

Son.—What! if I were cast into any foreign country, or herborizing in the fields in our own country, could I at once tell the scientific name of any plant I might happen to meet with?

Father.—This is literally the fact, which will prove to you the great advantage to be derived from System.

Son.—We come to a knowledge of plants by system, as we would climb up a ladder to get to the top of a house, step by step, and as we could not get up any other way; so without science, we could never arrive at a perfect knowledge of plants.

Father.—Exactly so. This will be illustrated in our next conversation.

Son.—Will you have the kindness to explain to me the orders of Class XIX. SYNG

NESIA, anthers united, flowers mostly compound.

Father.—The orders are six.

No. *Names.*

- | | |
|-------------------------------------|-----------------------|
| I. POLYGAMIA, <i>Equalis</i> , | Equal Polygamy. |
| II. POLYGAMIA, <i>Superflua</i> , | Superfluous Polygamy. |
| III. POLYGAMIA, <i>Frustranea</i> , | Useless Polygamy. |
| IV. POLYGAMIA, <i>Necessaria</i> , | Necessary Polygamy. |
| V. POLYGAMIA, <i>Segregata</i> , | Separate Polygamy. |
| VI. MONOGAMIA, | Single Marriage. |

Son.—I am frightened absolutely at these hard words.

Father.—In mathematics, there is one proposition called *Pons Asinorum*, Asses-Bridge, which if got over, all then is called easy.

Son.—Is it the same here?

Father.—So they say, but to understand well these orders, requires only a little attention. The word POLYGAMIA, is from πολυς, *polus*, many, and γαμος, *gamos*, marriage, a word used in English to express the Eastern custom of one man having many wives. The word MONOGAMIA, is from μονος, *monos*, one, and γαμος, *gamos*, marriage.

Son.—Why is the first order here called order I. *Equal* POLYGAMY (POLYGAMIA *equalis*)?

Father.—Because all the florets are alike, either *ligulate*, or *tubular*, that is, all the florets are alike on the same plant.

Son.—This I understand from the conversa-

tion on the Corollas, when you were explaining the compound flowers.

Father.—The *Dandelion* (LEONTODON), and *Succory* (INTUBUS), are examples of the *Ligulate* florets, and the *Artichoke* (CYNARA), and *Thistle* (CARDUS), of the *Tubular* florets.

Son.—What is the definition of order II. *Superfluous Polygamy* (POLYGAMIA *superflua*).

Father.—Here the complete flower does not consist of the *same kind* of florets. It is *compounded of two kinds of florets*, one kind forming a *circumference or disk*, a circle of florets, and *these florets are all tubular and bisexual*, hence the *disk* contains seeds—also a *different kind of florets in the ray or circumference*, which are all *ligulate*, and these last, if examined, are all *unisexual*, that is, *pistilliferous*; they are female flowers, and naturally would range under the Class XXIII. POLYGAMIA, as having *bisexual and unisexual* flowers upon the *same plant*. But this would be a dreadful separation of this natural order, and hence these have been properly reserved for the same class.

Son.—Why called *superflua*?

Father.—From the idea, that as the *bisexual* florets produce seed, the *unisexual* florets in the *circumference*, are *superfluous*, as far as relates to the production of SEEDS.

Son.—Are these *ligulate* florets useless?

Father.—By no means, as they close up at

night, and against rain, thus serving as parapluis.

Son.—Although these flowers are so different, do they produce the same kind of seeds?

Father.—They do; for the seeds of the florets of the disk and of the ray, produce, when sown, exactly the same kind of plant.

Son.—This is very extraordinary.

Father.—Nature is always making seeming difficulties, and overcoming them. The female florets are rendered fertile by the central bisexual florets.

Son.—Has any experiment been made to ascertain this?

Father.—Yes; if the central florets be removed, the circumferal florets produce no seed.

Son.—I fully understand this now. Will you have the goodness to explain now order III. Useless POLYGAMY (POLYGAMIA frustranea).

Father.—This is easily understood, by considering that the florets in the circumference have no pistil at all, or else an attempt towards forming a pistillum which of course must be abortive.

Son.—There are then only seeds in the centre from the bisexual florets, and none in the circumference.

Father.—This is the fact.

Son.—Are the florets in the ray then perfectly useless to the plants?

Father.—No; as they shut up before rain, and at night, they serve as protection to the *central bisexual florets*. The *Sun-flower* (HELIANTHUS), and *Blue-bottle* (CENTAUREA), are examples of this kind of Polygamy.

Son.—What is the meaning of order IV POLYGAMIA *necessaria* (*Necessary POLYGAMY*).

Father.—This is when the *bisexual florets* in the *centre*, from want of the *pistillum* being perfect, produce *no seeds*—whilst those of the *circumference* produce *perfect seeds*.

Son.—What is an example of this?

Father.—The *Marygold* (CALENDULA).

Son.—What! do you find *seeds* only in the *circumference* of the flower of the *Marygold*, in the *ray*, and not in the *disk*, or *centre*.

Father.—This is the fact, and the *circle of seeds* in the *circumference* look like so many *small insects*, with prickly backs, probably one of the means Nature has taken to preserve the flower, each looking as if pre-occupied.

Son.—What is the fifth order, POLYGAMIA *Segregata*, (*Segregated*, or *Separate POLYGAMY*)?

Father.—This is very easy. All the other compound flowers have a *common calyx* only, each floret being without any calyx of its own, but here each floret is separated from the rest

(segregata) by having a calyx of its own, a proper calyx, CALYX, a perianth.

Son.—Can these be easily represented by any figures?

Father.—Yes; which will render this intelligible, thus :

The three
sorts of
Compound
Radiate
Flowers.



II. POLY-
GAMIA
superflua.

Superfluous
POLY-
GAMY.

In the Ray
Female
Flowers.



III. POLY-
GAMIA
frustranea.

Abortive
POLY-
GAMY.

In the Disk
Bisexual
Flowers.



IV. POLY-
GAMIA
necessaria.

Necessary
POLY-
GAMY.

Son.—What is order V. **POLYGAMIA Monogamia?**

Father.—Here the flowers are *not compound*, but have the **CLASSICAL character**, 5 *stamina*, with the *anthers united*.

Son.—What are examples of this last order?

Father.—**LOBELIA** (*Cardinal's Flower*), and **VIOLA** (*Violet*).

Son.—Should the anthers unite, and exceed five in number, as the *Ericas* and *Andromeda*, would such a flower come into the order, *Monogamia?*

Father.—By no means; yet there does not appear much reason for such omission, and this order has been objected to altogether, and would be improved by the omission; but as an *artificial system*, he has chosen to retain it.

Son.—What are the orders to class **XX. GYNANDRIA?**

Father.—These are taken from *the number of stamens*, order I. **Diandria**. II. **Triandria**, and so on.

Son.—What are the orders to classes **XXI. MONŒCIA**, and **XXII. DICŒCIA?**

Father.—Order I. **Monandria**. II. **Diandria**, and so on, including all the preceding classes.

Son.—What are the orders to class **XXIII. POLYGAMIA?**

Father.—Order I. MONŒCIA. II. DIŒCIA.
III. TRIŒCIA.

Son.—What are the orders to CRYPTOGAMIA?

Father.—Order I. FILICES. II. MUSCI.
III. ALGÆ. IV. FUNGI.

Son.—I would thank you much to continue this interesting subject.

Father.—This I will gladly do.

Son.—May I beg the favor of you to recapitulate what relates to the Sexual System?

Father.—Permit me now to request your answer to those questions I shall first propose to you.

Son.—Certainly.

Father.—How is the Linnæan System contrived?

Son.—The Vegetable Kingdom is divided by LINNÆUS into *twenty-four* CLASSES, each of which is founded on the *Number, Insertion, Equality, Connection, Situation, or Absence* of the STAMINA.

On Number only are formed the first eleven CLASSES, from I. MONANDRIA, to XI. DODECANDRIA.

On Number and Insertion, XII. ICOSANDRIA, and XIII. POLYANDRIA.

On Number and Equality. XIV. DIDYNAMIA, and XV. TETRADYNAMIA.

On Connection. XVI. MONADELPHIA, XVII. DIADELPHIA, XVIII. POLYADELPHIA, and XIX. SYNGENESIA.

On Insertion only. XX. GYNANDRIA.

On Situation. XXI. MONŒCIA, XXII. DIŒCIA, and XXIII. POLYGAMIA.

On Absence. XXIV. CRYPTOGAMIA.

Father.—Repeat the names of the *Twenty-four* CLASSES.

Son.—The names of the *Twenty-four* CLASSES, are

<i>No.</i>	<i>Names.</i>
I.	MONANDRIA.
II.	DIANDRIA.
III.	TRIANDRIA.
IV.	TETRANDRIA.
V.	PENTANDRIA.
VI.	HEXANDRIA.
VII.	HEPTANDRIA.
VIII.	OCTANDRIA.
IX.	ENNEANDRIA.
X.	DECANDRIA.
XI.	DODECANDRIA.
XII.	ICOSANDRIA.
XIII.	POLYANDRIA.
XIV.	DIDYNAMIA.
XV.	TETRADYNAMIA.
XVI.	MONADELPHIA.

XVII. DIADELPHIA.

XVIII. POLYADELPHIA.

XIX. SYNGENESIA.

XX. GYNANDRIA.

XXI. MONŒCIA.

XXII. DICŒCIA.

XXIII. POLYGAMIA.

XXIV. CRYPTOGAMIA.

Father.—Repeat the names of the several
ORDERS.

Son.—The Orders which depend on characters distinct from those of the Classes, are

No. Names.

I. MONOGYNIA.

II. DIGYNIA.

III. TRIGYNIA.

IV. TETRAGYNIA.

V. PENTAGYNIA.

VI. HEXAGYNIA.

VII. HEPTAGYNIA.

VIII. DECAGYNIA.

IX. ENDECAGYNIA.

X. DODECAGYNIA.

XI. POLYGYNIA.

I. GYMNOSPERMIA.

II. ANGIOSPERMIA.

I. SILICULOSA.

II. SILIQUOSA.

- I. POLYGAMIA *æqualis*.
- II. POLYGAMIA *superflua*.
- III. POLYGAMIA *necessaria*.
- IV. POLYGAMIA *frustranea*.
- V. POLYGAMIA *segregata*.
- VI. POLYGAMIA *monogamia*.
- III. TRIÆCIA.
 - I. FILICES.
 - II. MUSCI.
 - III. ALGÆ.
 - IV. FUNGI.

The names of the classes used as orders I need not repeat here.

Father.—I commend much your diligence. What you have now learnt you will never forget; it will be a treasure to you, until you die, and the trouble you have had will be considered by you as trifling in comparison of what you have already acquired.

Son.—I should wish you to present me the Sexual System of Linnæus, not in disjointed parts, but all put together.

Father.—This I will do with pleasure, seeing you take so much delight in the study of Botany.

RECAPITULATION.

THE SEXUAL SYSTEM OF LINNÆUS.

The Orders explained.

CLASS I. MONANDRIA (*One Stamen*)
contains *two* Orders.

- 1 *Monogynia* having one Pistillum.
- 2 *Digynia* . . . two Pistilla.

CLASS II. DIANDRIA (*Two Stamina*) con-
tains *three* Orders.

- 1 *Monogynia* having one Pistillum.
- 2 *Digynia* . . . two Pistilla.
- 3 *Trigynia* . . . three Pistilla.

CLASS III. TRIANDRIA (*Three Stamina*)
contains *three* Orders.

- 1 *Monogynia* having one Pistillum.
- 2 *Digynia* . . . two Pistilla.
- 3 *Trigynia* . . . three Pistilla.

CLASS IV. TETRANDIA (*Four equal Sta-
mina*) contains *three* Orders.

- 1 *Monogynia* having one Pistillum.

2 *Digynia* having two Pistilla.

3 *Tetragynia* . . four Pistilla.

CLASS V. PENTANDRIA (*Five Stamina*)
contains six Orders.

1 *Monogynia* having one Pistillum.

2 *Digynia* . . . two Pistilla.

3 *Trigynia* . . . three Pistilla.

4 *Tetragynia* . . four Pistilla.

5 *Pentagynia* . . five Pistilla.

6 *Polygynia* . . many Pistilla.

CLASS VI. HEXANDRIA (*Six equal Stamina*) contains five Orders.

1 *Monogynia* having one Pistillum.

2 *Digynia* . . . two Pistilla.

3 *Trigynia* . . . three Pistilla.

4 *Tetragynia* . . four Pistilla.

5 *Polygynia* . . many Pistilla.

CLASS VII. HEPTANDRIA (*Seven Stamina*) contains four Orders.

1 *Monogynia* having one Pistillum.

2 *Digynia* . . . two Pistilla.

3 *Trigynia* . . . three Pistilla.

4 *Heptagynia* . . seven Pistilla.

CLASS VIII. OCTANDRIA (*Eight Stamina*) contains *four* Orders.

- 1 *Monogynia* having one Pistillum.
- 2 *Digynia* . . . two Pistilla.
- 3 *Trigynia* . . . three Pistilla.
- 4 *Tetragynia* . . four Pistilla.

CLASS IX. ENNEANDRIA (*Nine Stamina*) contains *three* Orders.

- 1 *Monogynia* having one Pistillum.
- 2 *Trigynia* . . . three Pistilla.
- 3 *Hexagynia* . . six Pistilla.

CLASS X. DECANDRIA (*Ten Stamina*) contains *five* Orders.

- 1 *Monogynia* having one Pistillum.
- 2 *Digynia* . . . two Pistilla.
- 3 *Trigynia* . . . three Pistilla.
- 4 *Pentagynia* . . five Pistilla.
- 5 *Decagynia* . . ten Pistilla.

CLASS XI. DODECANDRIA (*Twelve to Nineteen Stamina*) contains *six* Orders.

- 1 *Monogynia* having one Pistillum.
- 2 *Digynia* . . . two Pistilla.
- 3 *Trigynia* . . . three Pistilla.
- 4 *Pentagynia* . . five Pistilla.

5 *Dodecagynia* having twelve Pistilla.

6 *Polygynia* . . . many Pistilla.

CLASS XII. ICOSANDRIA (*Twenty or more Stamina on the Calyx, or Corolla*) contains five Orders.

1 *Monogynia* having one Pistillum.

2 *Digynia* . . . two Pistilla.

3 *Trigynia* . . . three Pistilla.

4 *Pentagynia* . . five Pistilla.

5 *Polygynia* . . many Pistilla.

CLASS XIII. POLYANDRIA (*Twenty or more Stamina on the Receptacle*) contains seven Orders.

1 *Monogynia* having one Pistillum.

2 *Digynia* . . . two Pistilla.

3 *Trigynia* . . . three Pistilla.

4 *Tetragynia* . . four Pistilla.

5 *Pentagynia* . . five Pistilla.

6 *Hexagynia* , . six Pistilla.

7 *Polygynia* . . many Pistilla.

CLASS XIV. DIDYNAMIA (*Two long Stamens, and two short*) contains two orders.

1 *Gymnospermia*, Seeds naked in the bottom of the Calyx.

2 *Angiospermia*, Seeds contained in a Pericarp.

CLASS XV. TETRADYNAMIA (*Four long Stamens, two short*) contains two Orders.

1. *Siliculosa*, Seeds in a short, or round pod.
2. *Siliquosa*, Seeds in a long pod.

CLASS XVI. MONADELPHIA (*Filaments united at bottom into one Body*) contains five Orders.

1. *Pentandria* having five Stamina.
2. *Decandria* . . . ten Stamina.
3. *Endecandria* . . . eleven Stamina.
4. *Dodecandria* . . . twelve Stamina.
5. *Polyandria* . . . many Stamina.

CLASS XVII. DIADELPHIA (*Filaments united at bottom into two Bodies*) contains four Orders.

1. *Pentandria* having five Stamina.
2. *Hexandria* . . . six Stamina.
3. *Octandria* . . . eight Stamina.
4. *Decandria* . . . ten Stamina.

CLASS XVIII. POLYADELPHIA (*Filaments united into three or more Bodies*) contains four Orders.

1. *Pentandria* having five Stamina.
2. *Dodecandria* . . . twelve Stamina.

3 *Icosandria* having twenty Stamina.

4 *Polyandria* . many Stamina.

CLASS XIX. SYNGENESIA (*Five united Anthers*) contains six Orders.

1 *Polygamia equalis*, when all the flosculi, or florets are bisexual.

2 *Polygamia superflua*, when the florets in the centre are bisexual, and those in the circumference female.

3 *Polygamia frustranea*, when the florets in the centre are bisexual, and those in the circumference barren.

4 *Polygamia necessaria*, when the bisexual florets in the centre produce no seed, but the pistil florets in the circumference produce perfect seed.

5 *Polygamia segregata*, many partial or proper calyxes within the common calyx, separating the flosculi or florets.

6 *Polygamia monogamia*, containing simple flowers (i. e. not compound), yet have their five Anthers united.

CLASS XX. GYNANDRIA (*Stamens growing out of the Pistil, or on an elongated Receptacle*) contains eight Orders.

1 *Diandria* having two Stamina.

- 2 *Triandria* having three Stamina.
- 3 *Tetrandria* . . four Stamina.
- 4 *Pentandria* . . five Stamina.
- 5 *Hexandria* . . six Stamina.
- 6 *Decandria* . . ten Stamina.
- 7 *Dodecandria* . twelve Stamina.
- 8 *Polyandria* . . many Stamina.

CLASS XXI. MONŒCIA (*Unisexual flowers on the same plant*) contains eleven Orders.

- 1 *Monandria* having one Stamen.
- 2 *Diandria* . . . two Stamina.
- 3 *Triandria* . . three Stamina.
- 4 *Tetrandria* . . four Stamina.
- 5 *Pentandria* . . five Stamina.
- 6 *Hexandria* . . six Stamina.
- 7 *Heptandria* . . seven Stamina.
- 8 *Polyandria* . more than seven Stamina.
- 9 *Monadelphica*, Filaments united in one body.
- 10 *Syngenesia*, Anthers united.
- 11 *Gynandria*, Stamina growing out of the Pistil.

CLASS XXII. DICŒCIA (*Unisexual flowers on different plants*) contains fourteen Orders.

- 1 *Monandria* having one Stamen.
- 2 *Diandria* . . two Stamina.
- 3 *Triandria* . . three Stamina.
- 4 *Tetrandria* . . four Stamina.
- 5 *Pentandria* . . five Stamina.
- 6 *Hexandria* . . six Stamina.
- 7 *Octandria* . . eight Stamina.
- 8 *Enneandria* . . nine Stamina.
- 9 *Decandria* . . ten Stamina.
- 10 *Dodecandria* . twelve Stamina.
- 11 *Monadelphia*, Filaments united.
- 12 *Polyadelphia*, many Stamina.
- 13 *Syngenesia*, Anthers united.
- 14 *Gynandria*, Stamina growing out of the Pistil.

CLASS XXIII. POLYGAMIA (*Bisexual and Unisexual flowers*) contains three Orders.

1 *Monœcia*, Bisexual, and male or female flowers on the same plant.

2 *Diœcia*, Bisexual, and male or female flowers on separate plants.

3 *Triœcia*, Bisexual, also male and female flowers, growing separately on three distinct plants of the same species.

CLASS XXIV. CRYPTOGAMIA (*Sta-*

mina and Pistils concealed) contains five Orders.

- 1 *Filices*, comprehends the Ferns.
- 2 *Musci*, the Mosses.
- 3 *Algæ*, includes the Fuci or sea-weeds.
- 4 *Fungi*, contains the Mushroom.
- 5 *Hepaticæ*, possesses the Liverworts.

Father.—Having gone through this beautiful System of LINNÆUS, our next step is to examine this system, by the consideration of the most striking *examples*, always preferring illustrations with *British Plants*, where this can be done, or the most common *Exotics*.

Son.—I feel happy to advance in this science.

THE SEXUAL SYSTEM FURTHER ILLUSTRATED.

CLASSES AND ORDERS EXPLAINED BY EXAMPLES.

CLASS I. MONANDRIA contains two ORDERS.

ORDERS.

EXAMPLES.

- 1 *Monogynia* having one Pistillum. *Salicornia*, (Jointed Glass-wort.) *Canna*, E.*
(Indian Flowering Reed.)
2 *Digynia* . . . two Pistilla. *Callitriche*, (Star-headed Water Chickweed.)
Blitum, E. (Strawberry Spinage.)

* *E. indica* *Exotics*; those not marked so, are the natural produce of Great Britain.

CLASS II. DIANDRIA contains three ORDERS.

ORDERS.

EXAMPLES.

- 1 *Monogynia* having one Pistillum. *Ligustrum*, (Privet.) *Veronica*, (Speedwell.)
 2 *Digynia* . . . two Pistilla. *Anthoxanthum*, Sweet-scented Vernal-Grass.)
 3 *Trigynia* . . . three Pistilla. *Piper*, E. (Pepper.)

CLASS III. TRIANDRIA contains three ORDERS.

- 1 *Monogynia* having one Pistillum. *Valeriana*, (Valerian.) *Crocus*, (Saffron.) *Iris*.
 2 *Digynia* . . . two Pistilla. *Gramina pleraque*, most of the Grasses.
 3 *Trigynia* . . . three Pistilla. *Montia*, (Water Chickweed, or Blinks.)

CLASS IV. TETRANDRIA contains three ORDERS.

- * 1 *Monogynia* having one Pistillum. *Dipsacus*, (Teasel.) *Scabiosa*, (Scabious.)
Plantago, (Plantain.)

- 2 *Digynia* . . . two Pistilla. *Aphanes*, (Parsley-piert.)
 3 *Tetragynia* . . . four Pistilla. *Potamogeton*, (Pondweed.)

CLASS V. PENTANDRIA contains six ORDERS.

- 1 *Menogynia* having one Pistillum. *Primula*, (Primrose.) *Convolvulus*.—*Lonicera*,
 (Honeysuckle.)
 2 *Digynia* . . . two Pistilla. *Gentiana*.—*Centaurium*, (Centory.) *Conium*,
 (Hemlock.) *Ulmus*, (Elm.)
 3 *Trigynia* . . . three Pistilla. *Viburnum*, (Wayfaring Tree.) *Sambucus*,
 (Elder.)
 4 *Tetragynia* . . . four Pistilla. *Parnassia*, (Grass of Parnassus.)
 5 *Pentagynia* . . . five Pistilla. *Statice*, (Thrift.) *Linum*, (Flax.) *Drosera*,
 (Sundew.)
 6 *Polygynia* . . . many Pistilla. *Myosurus*, (Mouse-tail.)

CLASS VI. HEXANDRIA contains five ORDERS.

ORDERS.

EXAMPLES.

- | | | |
|---|--|---|
| 1 | <i>Monogynia</i> having one Pistillum. | <i>Hyacinthus</i> , (Hyacinth.) <i>Convallaria</i> , (Lily of the Valley.) <i>Narcissus</i> , (Daffodil.) |
| 2 | <i>Digynia</i> . . . two Pistilla. | <i>Oryza</i> , E. (Rice.) |
| 3 | <i>Trigynia</i> . . . three Pistilla. | <i>Rumex</i> , (Dock.) <i>Colchicum</i> , (Meadow-Saffron.) |
| 4 | <i>Tetragynia</i> . . . four Pistilla. | <i>Petiveria</i> , E. (Guinea-Hen Weed.) |
| 5 | <i>Polygynia</i> . . . many Pistilla. | <i>Alisma</i> , (Water Plantain.) |

CLASS VII. HEPTANDRIA contains four ORDERS.

- | | | |
|---|---|---|
| 1 | <i>Monogynia</i> having one Pistillum. | <i>Tientalis</i> , (Chickweed Winter Green.) <i>Æsculus</i> , E. (Horse-Chesnut.) |
| 2 | <i>Digynia</i> . . . two Pistilla. | <i>Limeum</i> , E. |
| 3 | <i>Trigynia</i> . . . three Pistilla. | <i>Saururus</i> , E. (Lizard's-tail.) |
| 4 | <i>Heptagynia</i> . . . seven Pistilla. | <i>Septas</i> , E. |

CLASS VIII. OCTANDRIA contains four ORDERS.

- 1 *Monogynia* having one Pistillum. *Epilobium*, (Willow-Herb.) *Erica*, (Heath.)
Daphne, (Mezereon.)
- 2 *Digynia* . . . two Pistilla: *Galenia*, E.—*Weinmannia*, E. (Mountain Chick-weed.)
- 3 *Trigynia* . . . three Pistilla. *Polygonum*, (Bistort.) *Persicaria*, (Knot-Grass.)
- 4 *Tetragynia* . . . four Pistilla. *Paris*, (Herb Paris.) *Adoxa Moschatellina*, (Tuberous Moschatel.)

CLASS IX. ENNEANDRIA contains three ORDERS.

- 1 *Monogynia* having one Pistillum. *Laurus*, E. (Bay, Sassafras.)
- 2 *Trigynia* . . . two Pistilla. *Rheum*, E. (Rhubarb.)
- 3 *Hexagynia* . . . six Pistilla. *Butomus*, (Flowering Rush.)

CLASS X. DECAKDRIA contains five ORDERS.

ORDERS.

EXAMPLES.

- | | | | |
|---|--|--|---------------------------------|
| 1 | <i>Monogynia</i> having one Pistillum. | <i>Arbutus</i> , (Strawberry Tree.) | <i>Ruta</i> , E. (Rue.) |
| 2 | <i>Digynia</i> . . . two Pistilla. | <i>Pyrola</i> , (Winter Green.) | |
| 3 | <i>Trigynia</i> . . . three Pistilla. | <i>Saxifraga</i> , (Saxifrage.) | <i>Dianthus</i> , (Pink) |
| | | <i>ponaria</i> , (Soap-wort.) | |
| 4 | <i>Pentagynia</i> . . . five Pistilla. | <i>Cucubalus</i> , (Spatling Poppy.) | <i>Stellaria</i> , (Stichwort.) |
| | | <i>Sedum</i> , (Stonecrop.) | <i>Oxalis</i> , (Wood-Sorrel.) |
| | | <i>Agrostemma</i> , (Cockle.) | <i>Lychnis</i> , (Meadow Pink.) |
| 5 | <i>Decagynia</i> . . . ten Pistilla. | <i>Basella</i> , E. (American Nightshade.) | |

CLASS XI. DODECANDRIA contains six ORDERS.

- | | | | |
|---|--|-------------------------------|---|
| 1 | <i>Monogynia</i> having one Pistillum. | <i>Asarum</i> , (Asarabacca.) | <i>Lythrum</i> , (Purple-spiked Loosestrife.) |
|---|--|-------------------------------|---|

- 2 *Digynia* . . . two Pistilla. *Agrimonia*, (Agrimony.) *Heliocarpus*, F.
 3 *Trigynia* . . . three Pistilla. *Roseda*, (Dyer's-Weed.) *Euphorbia*, (Spurge.)
 4 *Tetragynia* . . . four Pistilla. *Calligonum*, E.
 5 *Pentagynia* . . . five Pistilla. *Glaucus*, E.
 6 *Dodecagynia* . . . twelve Pistilla. *Sempervivum*, (Houseleek.)

CLASS XII. ICOSANDRIA contains five ORDERS.

- 1 *Monogynia* having one Pistillum. *Prunus*, (Black Thorn.) *Myrtus*, E. (Myrtle.)
Amygdalus, E. (Almond.)
 2 *Digynia* . . . two Pistilla. *Cratægus*, (Hawthorn, White Bean Tree, Wild
 Service-Tree.)
 3 *Trigynia* . . . three Pistilla. *Sorbus*, (Mountain Ash, True Service-Tree.)
 4 *Pentagynia* . . . five Pistilla. *Mespilus*, (Medlar.) *Spiræa Ulmaria*, *Filipen-*
dula, (Meadow-sweet, Drop-wort.)

ORDERS.	EXAMPLES.
5 <i>Polygynia</i> having many Pistilla.	<i>Rosa</i> , (Rose.) <i>Rubus</i> , (Bramble.) <i>Tormentilla</i> , (Tormentil.) <i>Fragaria</i> , (Strawberry.)

CLASS XIII. POLYANDRIA contains seven ORDERS.

1 <i>Monogynia</i> having one Pistillum.	<i>Papaver</i> , (Poppy.) <i>Chelidonium</i> , (Celandine.) <i>Nymphaea</i> , (Water-Lily.)
2 <i>Digynia</i> . . . two Pistilla.	<i>Fothergilla</i> , E.— <i>Calligonum</i> , E.— <i>Paeonia</i> , E. (Piony.)
3 <i>Trigynia</i> . . . three Pistilla.	<i>Delphinium</i> , (Larkspur.) <i>Aconitum</i> , (Monks- hood.)
4 <i>Tetragynia</i> . . . four Pistilla.	<i>Cimicifuga</i> , E.— <i>Tetracera</i> , E.— <i>Caryocar</i> , E.
5 <i>Pentagynia</i> . . . five Pistilla.	<i>Aquilegia</i> , (Columbine.) <i>Reaumuria</i> , E.— <i>Ni- gella</i> , E. (Fennel-Flower, Devil in the Bush.)

- 6 *Hexagynia* . . . six Pistilla. *Stratiotes*, (Fresh-water Soldier.)
 7 *Polygynia* . . . many Pistilla. *Adonis*, (Pheasant's-Eye.) *Ranunculus*, (Crow-foot.) *Helleborus*, (Hellebore.)

CLASS XIV. DIDYNAMIA contains two ORDERS.

- 1 *Gymnospermia*, Seeds contained in the bottom of the Calyx. *Glechoma*, (Ground-Ivy.)
 Lanium, (Dead-Nettle.) *Melissa*, (Baum.)
 Antirrhinum, (Snapdragon.) *Digitalis*, (Foxglove.) *Scrophularia*, (Water-Betony.)
- 2 *Angiospermia*, Seeds contained in a Pericarp.

CLASS XV. TETRADYNAMIA contains two ORDERS.

ORDERS.

EXAMPLES.

- | | | | | |
|---|--|-------------------------------------|------------------------------|--------------------------------------|
| 1 | <i>Siticulosa</i> , Seeds in a small, short, or round pod. | <i>Draba</i> , (Whitlow-Grass.) | <i>Lunaria</i> , (Honesty.) | <i>Thlaspi</i> , (Shepherd's-Purse.) |
| 2 | <i>Siliquosa</i> , Seeds in a long slender pod. | <i>Cheiranthus</i> , (Wall-Flower.) | <i>Brassica</i> , (Cabbage.) | <i>Sinapis</i> , (Mustard.) |

CLASS XVI. MONADELPHIA contains five ORDERS.

- | | | |
|---|--|--|
| 1 | <i>Pentandria</i> having five Stamina. | <i>Hernandia</i> , E.— <i>Wultheria</i> , E.— <i>Melochia</i> , E. |
| 2 | <i>Decandria</i> . . . ten Stamina. | <i>Geranium</i> , (Crane's-bill.) |
| 3 | <i>Endecandria</i> . . . eleven Stamina. | <i>Brownea</i> , E. |
| 4 | <i>Dodecandria</i> . . . twelve Stamina. | <i>Pentapetes</i> , E. |
| 5 | <i>Polyandria</i> . . . many Stamina. | <i>Malva</i> , (Mallow.) |

CLASS XVII. DIADELPHIA contains four ORDERS.

- 1 *Pentandria* having five Stamina. *Monnèria*, E.
- 2 *Hexandria* . . . six Stamina. *Fumaria*, (Fumitory.)
- 3 *Octandria* . . . eight Stamina. *Polygala*, (Milk-wort.)
- 4 *Decandria* . . . ten Stamina. *Pisum*, (Pea.) *Ulex*, (Furze.) *Trifolium*,
(Trefoil.)

CLASS XVIII. POLYADELPHIA contains four ORDERS.

- 1 *Pentandria* having five Stamina. *Theobroma*, E.
- 2 *Dodecandria* . . twelve Stamina. *Monsonia*, E.
- 3 *Icosandria* . . twenty Stamina. *Citrus*, E. (Orange.)
- 4 *Polyandria* . . many Stamina. *Hypericum*, (St. John's Wort.)

CLASS XIX. SYNGENESIA contains six ORDERS.

ORDERS.

EXAMPLES.

- 1 *Polygamia equalis*, when all the flosculi or florets are bisexual. *Leontodon*, (Dandelion.) *Sonchus*, (Sow-Thistle.) *Hieracium*, (Hawkweed.) *Carduus*, (Common Thistle.)
- 2 *Polygamia superflua*, when the florets in the centre are bisexual, and those in the circumference female. *Anthemis*, (Mayweed.) *Bellis*, (Daisy.) *Senecio*, (Groundsel.) *Chrysanthemum*, (Ox-eye Daisy.) *Tussilago*, (Coltsfoot.) *Inula*, (Elecampane.)
- 3 *Polygamia frustranea*, when the florets in the centre are bisexual, and those in the circumference barren. *Centaurea*, (Blue-bottle, Knapweed.) *Helianthus*, E. (Sunflower.) *Rudbeckia*, E.
- 4 *Polygamia necessaria*, when the bisexual florets in the center produce no seed, but the pistil florets in the circumference produce per-

fect seed. *Calendula*, E. (Marigold.) *Silphium*, E.
Gnaphalium, (Cudweed). *Arctotis*, E.

5 *Polygamia segregata* many partial flower cups or calyces within the common calyx, separating the flosculi or florets. *Echinops*, E. (Globe Thistle.) *Gundelia*, E. *Stoebe*, E. *Oedera*, E. *Spheranthus*, E.

6 *Polygamia Monogamia* contains simple flowers which have their antheræ united. *Viola*, (Violet.) *Impatiens*, (Touch-me-not, Balsam.) E. *Lobelia*, E. or (Cardinal Flower.)

CLASS XX.—GYNANDRIA contains eight ORDERS.

- 1 *Diandria* having two Stamina. *Orchis*. *Cypripedium*, (Ladies Slipper.)
- 2 *Triandria* . . . three Stamina. *Sisyrinchium*, E.—*Ferraria*, E.
- 3 *Tetrandria* . . . four Stamina. *Nepenthes*, E.
- 4 *Pentandria* . . . five Stamina. *Passiflora*, E. (Passion Flower.) *Gluta*, E.

ORDERS.

EXAMPLES.

- 5 *Hexandria* . . . six Stamina. *Aristolochia*, E.—*Pistia*, E.
 6 *Dicandria* . . . ten Stamina. *Kleinovia*, E.—*Helicteres*, E. (Screw Tree.)
 7 *Dodecandria* . . twelve Stamina. *Cytinus*, E.
 8 *Polyandria* . . many Stamina. *Arum*, (Cuckow-pint.)

CLASS XXI.—MONŒCIA contains eleven ORDERS.

- 1 *Monandria* having one Stamen. *Chara*.—*Zannichellia* (Horned Pondweed.)
Elaterium, E. (Wild Cucumber.)
 2 *Diandria* . . . two Stamina. *Lemna*, (Duckmeat). *Anguria*, E.
 3 *Triandria* . . . three Stamina. *Sparganium*, (Burr-Reed), *Typha*, (Cats-tail)
Carex.
 4 *Tetrandria* . . . four Stamina. *Urtica*, (Nettle.) *Morus*, E. (Mulberry.) *Bucus*.
 (Box.) *Betula*, (Birch.)
 5 *Pentandria* . . . five Stamina. *Xanthium*, (Lesser Burdock.) *Amaranthus*, E.
 (Amaranth.)

- | | | | |
|----|--|----------------|---|
| 6 | <i>Hexandria</i> . . . | six Stamina. | <i>Zizania</i> , E.— <i>Pharus</i> , E. |
| 7 | <i>Heptandria</i> . . . | seven Stamina. | <i>Guttarda</i> , E. |
| 8 | <i>Polyandria</i> more than seven Stamina. | | <i>Fagus</i> , (Beech.) <i>Sagittaria</i> , (Arrow-head.)
<i>Corylus</i> , (Hazel.) <i>Quercus</i> , (Oak.) |
| 9 | <i>Monadelphina</i> Filaments united. | | <i>Pinus</i> , (Fir.) <i>Hura</i> , E. (Sand-box Tree.)
<i>Thuja</i> , E. (Arbor Vitæ.) <i>Cupressus</i> , E.
(Cypress.) <i>Ricinus</i> , E. (Palma Christi.) |
| 10 | <i>Syngnesia</i> Anthers united. | | <i>Cucumis</i> , F. (Cucumber.) <i>Trichosanthes</i> , E.
(Serpent Cucumber.) <i>Cucurbita</i> , F. (Gourd)
<i>Momordica</i> , (Male Balsam Apple.) |
| 11 | <i>Cynandria</i> Stamina growing out of the Pistillum. | | <i>Andrachne</i> , (Bastard Orpine.) <i>Agyneja</i> , E. |

CLASS XXII.—DICECIA contains fourteen Orders.

I *Monandria* having one Stamen. *Najas*, E.

ORDERS.	EXAMPLES.
2 <i>Diandria</i> . . .	two Stamina. <i>Salix</i> , (Willow.) <i>Vallisneria</i> , E.
3 <i>Triandria</i> . . .	three Stamina. <i>Empetrum</i> , (Crow Berries.) <i>Osyris</i> , E. (Poets Cassia.)
4 <i>Tetrandria</i> . . .	four Stamina. <i>Hippophaë</i> , (Sea Buckthorn.) <i>Viscum</i> , (Mistletoe.) <i>Myrica</i> , (Gale.)
5 <i>Pentandria</i> . . .	five Stamina. <i>Cannabis</i> , E. (Hemp.) <i>Humulus</i> , (Hop). <i>Spinachia</i> , E. (Spinach.) <i>Pistachia</i> , E. (<i>Pistachia Nut</i> .)
6 <i>Hexandria</i> . . .	six Stamina. <i>Tamus</i> , (Black Bryony.) <i>Smilax</i> , E. (Rough Bindweed.) <i>Dioscorea</i> , E.
7 <i>Octandria</i> . . .	eight Stamina. <i>Populus</i> , (Poplar.) <i>Rhodiola</i> , (Rose-Root.)
8 <i>Enneandria</i> . . .	nine Stamina. <i>Mercurialis</i> , (Mercury.) <i>Hydrocharis</i> , (Frogbit)
9 <i>Decandria</i> . . .	ten Stamina. <i>Carica</i> , E. (Papaw.) <i>Schinus</i> , E. (Indian Mastic.)

- 10 *Dodecandria*. twelve Stamina. *Menispermum*, E. (Moon Seed.) *Datisca*, E.
 (Bastard Hemp.)
 11 *Polyadelphia*. many Stamina. *Cliffortia*, E.
 12 *Monadelphia* Filaments united. *Juniperus*, (Juniper.) *Taxus*, (Yew.) *Ephedra*, E. (Shrubby Horsetail.)
 13 *Syngenesia* Anthers united. *Ruscus*, (Butchers Broom.)
 14 *Gynandria* Stamina growing out
 of the Pistillum. *Clusia*, F.

CLASS XXIII.—POLYGAMIA contains three ORDERS.

- 1 *Monœcia* Bisexual and male or female flowers on the same plant. *Valantia*,
 (Cross-wort.) *Acer*, (Maple.) *Parietaria*, (Pellitory of the Wall.)
Atriplex, (Orach.)
 2 *Diœcia* Bisexual, and male or female flowers on separate plants. *Fraxinus*, Ash.
Diospyrus, E. (Indian Date Plumb.) *Pisonia*, E. (Fringo.) *Gleditsia*, E. (Three-thorned Acacia.)

ORDERS.

EXAMPLES:

- 3 *Triæcia* Bisexual, male, and female flowers, growing separately on three distinct plants of the same species. *Ceratonia*, E. (Carob Tree.) *Ficus*, E. (Fig Tree.)

CLASS XXIV.—CRYPTOGAMIA contains four ORDERS.

- 1 *Filices* comprehending the *Filices*, (Ferns) *Ophioglossum*, (Adders-Tongue.)
Equisetum, (Horsetail.) *Pilularia*, (Pepper-Grass, &c.)
- 2 *Musci* comprehending the *Musci*, (Mosses of different kinds.)
- 3 *Algæ* including the *Fucus*, (Sea Weed.) *Lichen*, (Liverwort.) *Jungermannia*, &c.
- 4 *Fungi* containing the *Agaricus*, (Mushroom.) *Lycoperdon*, (Puff-Ball,) and other Plants of that Tribe.

NINTH CONVERSATION.

PRACTICAL EMPLOYMENT OF THE FORE-
GOING KNOWLEDGE.

Son.—I SHOULD wish much to put what I have learnt *into practice*.

Father.—This you will be *now* enabled to do.

Son.—Is it true, what you before said, that with the stock of knowledge I should possess, I shall be enabled to discover the *names* of *all unknown plants*, I may meet with in the *fields* or *garden*?

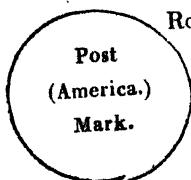
Father.—Each conversation took up five minutes reading, but we will say to study it, *an hour*; thus by eight hours study, in one short day, you have become so far a *Botanist*, as readily to *find the names* of *all plants* previously unknown to you, in the *fields* and *garden*.

Son.—This is truly astonishing!

Father.—It is not less true; but it is nothing more than the procedure of a letter-carrier.

Son.—How is this?

Father.—Suppose a letter directed to



Robert John Thornton, M.D.

No. 13, Union Court,

Broad Street,

London.

England.

Instead of this letter going to *Scotland, Wales, Ireland, France, Germany, Italy, &c.* it comes direct for ENGLAND.

Next, instead of going to *Birmingham, Bristol, Liverpool, Manchester, or Sheffield,* it comes straight to LONDON.

This is *divided* into *districts*; and the *postman*, who takes letters in the BROAD STREET district, goes with the letter to No. 13, UNION COURT, and it reaches Dr. THORNTON, without the least difficulty, which may contain a case requiring his opinion on it.

Son.—How does this apply to Botany?

Father.—As all letters sent are *sorted*, so it is with regard to plants.

Son.—Please to elucidate this further.

Father.—As letters are promiscuously received into the post-office, these are arranged.

First, as regards the above letter, all the letters destined for *England*, are put into one

bag, and sent in the packet. When this bag is received in *London*, these then are sorted out again, or *classed*. There are, as in Botany, classes, *counties* in the letters of the alphabet, and the same letters are put together. These then are subdivided, as *Liverpool, Lancaster, Ly-mington, Leicester, &c. &c.* which may be styled *Orders*.

ENGLAND here is the Class, and
LONDON, the Order.

In the two-penny post,
LONDON is the Class,
BROAD STREET the Order.

UNION COURT a division of that District,
DR. THORNTON the name to be sought.

Son.—Is it so in Botany?

Father.—Exactly; and whoever shall turn his mind so as to comprehend the extensive System of the Vegetable Kingdom, in the manner as at present taught, and has traced this System, descending from generals to particulars, will, by the mere exercise of the faculties employed for this purpose, acquire an habit of arrangement, a perception of order, of distinction, and subordination, which it is not perhaps in the nature of *any other study* so *effectually* to bestow. In this view the examination of the vegetable kingdom seems

peculiarly proper for *youth*, to whose unperverted minds the study of *natural objects* is always an interesting occupation, and who will not only find in this employment an innocent and a healthful amusement, but will *familiarize* themselves to that *regulated train of ideas*, that perception of relation between parts and the whole, which is of *use* not only in every other department of natural knowledge, but *in all the concerns of life*.

Son.—Do all plants carry their own *directions* with them?

Father.—This you will find to be the case.

Son.—I observe in the stove a beautiful scarlet flower, I should like much to know its name; will you have the goodness to say what it is *called*?

Father.—No! no! If you have made any progress in Botany, it is your business to tell it me.

Son.—But how am I to do this?

Father.—By applying the knowledge you have previously acquired; and like the *postman*, read the *inscription*, designating each plant.

Son.—The *postman* has his *DIRECTORY*, and where am I to procure a *Botanical Directory*?

Father.—LINNÆUS formed such a work for his pupils, which is about to be published,

entitled, the **BOTANIST'S VADE MECUM**, or second book, for the young student in Botany.

Son.—I feel very grateful on that account.

Father.—It was a wonderful effort of genius in Linnæus, first to contrive a system, embracing the whole vegetable world, and then to form the *generic characters* of plants.

Son.—What do you mean by the *generic characters* of plants?

Father.—A *certain character* which runs through each *species*.

Son.—I am still at a loss to comprehend this.

Father.—You know a dog, when you see it, and an horse.

Son.—Certainly.

Father.—How do you do this, but from a certain character, which runs through the different species of dog and horse? The *naturalist* defines *this character*.

Son.—I see now what you mean.

Father.—So with plants, there is a *common name*, which runs through *all the species* of the same genus, or family.

Son.—Please to explain this further.

Father.—Had not the like name been given to the same family, there would be no memory

so capacious, as to retain all the different names of plants.

Son.—This I understand. Thus I perceive people have FAMILY names, as Thornton, and we have the christian appellation to designate who is meant.

Father.—Exactly so. The Botanist has first to find the *generic*, or *family name*, of each plant.

Son.—Let me proceed, bringing my former knowledge into practice; and begin with that beautiful *red flower*, whose name I wish so much to know.

Father.—Proceed.

Son.—I must first find out the class, which I can very easily do, and observe it to fall under CLASS I. MONANDRIA, having only *one stamen*. I next find out the ORDER, and perceive it to fall under Order I. MONOGYNIA. I turn to my VADE MECUM, and find in this class only 22 flowers, which come under this class and order.

Further to assist the student, these are again divided into

- I. *Indigenous*, natives,
- II. *Exotics*, foreign plants.

This reduces the number to 20, the number of exotics, or stove-plants. These are again formed into sections.

Sect. I. Germen, beneath, three-celled,
and mostly reedy plants.

Sect. II. Germen, beneath, four-celled.

Sect. III. Germen, above.

Sect. III. Seed one, naked.

Now, as my plant is reedy, and has the germen, beneath, (beneath the corolla) pericarp, a capsule, three-celled, and many seeds; it falls under Sect. I. above described, which comprehends 14 flowers only; I have now (I presume) only to compare the characters of these 14, with my flower, and see what description exactly applies to my plant.

Father.—Right, and this is an easy task; as the generic characters by Linnæus, usually occupy but a few lines, or only one: go on.

Son.—The first in this list is, I find, thus described: (vide Plate I. of *Illustrations of Juvenile Botany.*)

CANNA.

Generic Characters.

COROLLA, six-parted (cut beyond the middle into six parts, or *segments*), one *segment* revolute (rolled back); ANTHÉR, sessile (without filament); CAPSULE, beneath; three-celled.

Now this description exactly corresponds to the *scarlet flower*, whose name I wished to know, and I find its name therefore to be CANNA.

Father.—Yes; this beautiful reedy plant

comes from the East Indies. It rises two feet high. Its *leaves* are nearly a foot long and half a foot broad, and of so firm a texture, that they are employed by the Chinese to cover their packages of tea; these embrace the stem, are ovate, or egg-shaped, pointed at each end, and with parallel nerves. The *Calyx*, a perianth, triphyllous (consisting of three leaves) erect, coloured (this is remarked as the calyx-leaves are usually green). *Corolla*, six-cleft, (cut into six laciniae, or divisions,) the three interior laciniae are longest, of which, one is reflexed (*bent* back, in the *Glauca*, it is revolute, curled round), the rest are erect. The *Anther* is oblong, separate, two-celled, seated upon the revolute laciniae. PERICARP, a capsule, three-celled, containing large globular *seeds*, black, as hard as shot, and sometimes used for that purpose, and also bored to string as rosaries, for Roman Catholics. It is a perennial plant, found between the tropics of Asia, Africa, and America, flowering with us in stoves, from February till December. It is called **CANNA Indica**, by Botanists. The English name is Common Indian Reed. Dr. Darwin, speaking of it, says—

“ First the tall CANNA lifts his *curled* brow
Erect to heaven, and plights his nuptial vow;
The virtuous pair, in milder regions born,
Dread the rude blast of Autumn’s icy morn;



The Noble Rose

Round the chill fair he folds his crimson vest,
And clasps the timorous beauty to his breast.

RENEALMIA.

Son.—Father, here is a beautiful plant indeed, it is a tree, upright, and eighteen feet in height, and its leaves exactly resemble those of the Canna. How I should like to know its name?

Father.—I hope you don't wish me to tell it you, and to keep you always in leading-strings. The use of Botany is to find out the right names of plants, after which you will find their nature and uses described in books.

Son.—I observe it is first protected by a leaf, which as soon as the flower bursts from its sheath, withers. It has a *common* CALYX, a large Spatha, of two leaves (diphyllous), coloured, which falls off, and the flowers then resemble a bunch of grapes, and all point in one direction, appearing imbricated, and take an elegant bend, all the buds appearing as if made of wax. As they expand, each flower takes a contrary direction, and it presents a beautiful clustre of flowers. *

Father.—Please to examine one of these.

Son.—The COROLLA I observe is *monophyllous*, (consisting of one leaf) being united

at the base. Two flowers are together, one of these in the state of bud.

Father.—Right.

Son.—This COROLLA is *three-parted* (divided more than half way), the upper *lacinia* (Segment) is emarginate (a piece cut out like an heart), the two under ones are entire, and smaller. This is of a white colour, striped with red.

Father.—Rightly expressed.

Son.—The next part is petal-like, resembling the cut finger of a glove, or the Corolla of our Fox-glove, but turned upwards, the under edge is beautifully waved. This I conceive to be the Nectary, and it is of a bright yellow colour.

Father.—How do you botanically express this part?

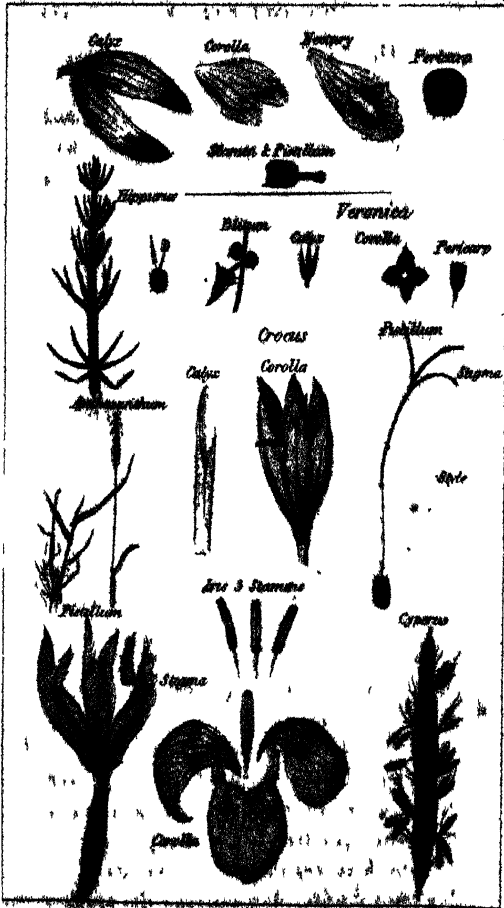
Son.—Nectary, funnel-shaped, petal-like, protecting the stamen and pistillum.

Father.—Describe these also, as you have done the other parts.

Son.—The *filament* of the STAMEN is long, surmounted by a twin-anther, betwixt which is curiously confined the *Style* of the PISTILLUM, beyond which is seen the Stigma.

Father.—After such an examination, pray tell me its name.

Son.—I turn of course to Class I. MONAN-



Sections of the Primulae No. 26.

BIA. Order I. MONOGYNIA, and as the *germen* was beneath (under the Corolla) three-celled, it comes under the first division, and looking over the *Generic characters*, I find a short description, which *exactly corresponds* to my flower, viz.

RENEALMIA.

Generic Character.—CALYX, a *spathe*, two-leaved ;
COROLLA, three-parted ; NECTARY, bell-shaped ;
PERICARP, a *berry*.

Father.—There is no other plant in the whole world of this class and order, to which such description applies, except to the *RENEALMIA nutans*, the *Nodding* *RENEALMIA*.

Son.—Why call this plant *RENEALMIA* ?

Father.—It is called so in honour of a Botanist, Paul *RENEAUME*, an eminent physician of *Blois*, who published at *Paris*, in 1611, an “*Historia Plantarum*.”

Son.—What, if I make a figure in Botany, shall I have some plant named in honour of me ?

Father.—As the works of Nature are imperishable, but by the fiat of the same power, which created them, so will your name thus, if you merit it, descend to the latest posterity.

Son.—I see then that the names of the plants are easily discovered by system. But are they to be acquired without it ?

Father.—This may be done by tradition, but then much error may creep in, and I may be misinformed, and am liable to forget, besides which, persons who acquire knowledge in this way, merit not the title of Botanists. They must possess the rudiments of the science, as contained in the several conversations, and then, whether they know many or few plants, they merit that honourable appellation, as they are able, whenever they please to employ their knowledge, for the acquisition of names.

Son.—Of what country is this plant a native?

Father.—It comes from *Surinam*, where the natives make a beautiful preserve of the red berries of this plant, which taste as deliciously, as they look delightful. It flowers in our stoves from July to the end of August, and an excellent figure of this plant is given in the *JUVENILE Illustrations of BOTANY*, or miniature representation of certain plants.*

Son.—Let us quit the *hot-house*, and go into the *fields*.

Father.—This is called *herborizing*.

Son.—You do not object to my proposal.

Father.—By no means. For “a knowledge of the plants of our country,” says the learned,

* These beautiful miniature Plates of *Juvenile Botany*, may be had of Messrs. Sherwood & Co. Paternoster-Row.

and illustrious Dr. Smith, in his *English Botany*, "is in many respects even preferable to that of *exotics*, as it can be more readily and completely attained, and is on several accounts more directly useful.

"There is no occasion to mention the indispensable necessity of such knowledge to those who are occupied with the rural economy of the country, to be well acquainted with its native vegetables; or to such who cultivate the healing art.

"Nor are the humble productions of our fields and woods deficient in real beauty, elegance, and singularity of structure; in which respect some of them even vie with the more favourite flowers from abroad.

"The study of *Indigenous plants* as an amusement, has this eminent advantage over *Exotic botany*,—that these are always found in their natural state of growth, and that they double the pleasure of every walk and journey, and a magnifying-glass is all the apparatus required."

Son.—ROUSSEAU has written also on this subject.

Father.—He has, and he observes "that the Botanist at every walk pleasantly glides from object to object; each flower he examines excites in him curiosity and interest, and as soon

as he comprehends the manner of its structure, and the rank it holds in a system, he enjoys an unalloyed pleasure, not less vivid, because it costs him no great expence or trouble. In this occupation it is that the violent passions are lulled into a dead calm, and only so much of emotion is produced as is sufficient to render life happy and agreeable.

“ All my *Botanical Excursions*,” continues ROUSSEAU, “ the several impressions which local objects gave, the ideas which in consequence sprung up, the little incidents which blended into the scene, all these have produced a delightful impression, which the sight of my *herbarium* at once rekindles. Although I may never again revisit that beautiful country, those dark forests, those crystal lakes, those hanging woods, those rugged rocks, those lofty mountains, whose sight so often captivated my heart; although these happy scenes are closed upon me for ever, yet am I transported back to them whenever I review the *herbarium* I possess. The little fragments of those plants I collected are of themselves sufficient to recal the whole of this magnificent spectacle. This *herbarium* of mine recommences for me a journey of delight, and, as a camera obscura, repaints all this scenery again to my view. It is this association which makes Botany so

charming; it recalls back to the imagination all those ideas which afford the truest pleasure. Meadows, water, woods, solitude, the *inward contentment*, which alone dwells among such objects, are incessantly brought forward to the memory. It at once transports me among habitations of peaceable beings, simple and kind, such as I should wish to pass my days with. It recalls back my infant hours, my innocent pleasures, and compels me to forget every unhappiness."

Son.—I should like to make an *Herbarium*.

Father.—This is easily done. Plants are to be collected, and spread out on a white sheet of paper to the best advantage, and then put betwixt some quires of blotting paper, and pressed by placing books or any weight upon these. They are then, after a few days, to be shifted, and pressed again, as before: but before you begin your *Herbarium*, you must collect many plants, and study them.

HIPPURIS.

Son.—Here is a curious plant, I observe, growing in water in the ditch I have just leaped over.

Father.—Pray examine it.

Son.—I see the leaves are in a whorl, or ring (verticillate); and in the arm-pit (axilla) of each leaf, I notice a small flower.

Father.—Examine this well.

Son.—I find it has neither *calyx* or *corolla*, only one perfect STAMEN, and one PISTILLUM.

Father.—Consult your *Vade Mecum*.

Son.—I turn to class 1. MONANDRIA; order 1. MONOGYNIA. I also go at once to the section 1. *Indigenous plants*, and find of this class, order, and section, there are only two plants, natives of Great Britain. 1. SALICORNEA (*jointed glass-work*); and 2. HIPPURIS (*Mare's-tail*). The generic description of the SALICORNIA is CALYX, one-leaved, ventricose, intire; COROLLA, none; SEEDS, enclosed by the calyx; STEM, leafless, succulent, articulate.—Now, as such description does not apply to my plant, as mine has no calyx, I am sure it is HIPPURIS *vulgaris* (*common Mare's-tail*), and I examine how the description tallies with my plant.

HIPPURIS.

Gen. Char.—CALYX, none; COROLLA, none; SEEDS, 1; LEAVES, verticillate; STEM, dry.

Which description exactly applies to my plant. It is, therefore, the HIPPURIS *vulgaris*.

Father.—Besides which, the SALICORNIA grows in *salt marshes*, and flowers in August and September. The HIPPURIS flowers in May and July, and is found in common *wet grounds* and *ditches*.

CALLITRICHE.

Son. Floating on the water, I observe another plant, whose name I should also wish to know.

Father.—Please to examine it.

Son.—I find it has also one *stamen*, but two *pistilla*.

Father.—Consult your *Vade Mecum*.

Son.—Of this class and order I find only *four* plants, *two* of which are *Exotics*, and *two* of them *Indigenous*. Are there no more?

Father.—So it is.

Son.—The discovery then here also is very easy.

Order II. DIGYNIA.

CALLITRICHE.

Gen. Char.—CALYX, none; COROLLA, 2-petalled; PERICARP, a *capsule*, 4-celled, 4-seeded.

BLITUM.

Son.—Here it is, Father, growing on this bank. The fruit very much resembles a *strawberry*, but has *no taste*. It must be BLITUM.

BLITUM.

Gen. Char.—CALYX, monophyllous (1-leaved), three-cleft; COROLLA, none; PERICARP, a red *berry*, 1-seeded.

Father.—The *English name* of CALLITRICHE is *Star-grass*, as the upper-leaves grow in form of a star, whence it is called *Stellaria Aquatica*, by RAY, and others. It is also called *Water Chick-weed*, as its stems and leaves float far on the water, and are often so matted together, as to bear a person walking on them. BLITUM, is *Strawberry Spinach*, from the resemblance to a *Strawberry*, and its leaves to *Spinach*.

Practice in Class II. DIANDRIA.

VERONICA.

Son.—Oh! Father, here is a beautiful blue flower, which looks so simple and pretty; pray what is it called?

Father.—Must I scold again? It is your business to tell it to me.

Son.—The two stamina are extremely visible, and the single pistillum. It is of the class II. DIANDRIA; order I. MONOGYNIA.

Father.—Turn now to your VADE MECUM.

Son.—Of *Indigenous Plants* of this class and order, I find only seven. Even these are arranged into sections.

Sect. I. COROLLA beneath (enclosing the seed) monopetalous, *regular*.

I soon see that my flower has not a regular corolla (that is, all the petals of the same form, and shape, and size). It cannot, therefore, come under the first section; but it falls into the second section.

Sect. II. COROLLA beneath, monopetalous, *irregular*.

The first plant in this section is thus described.

VERONICA.

Gen. Char.—CALYX, 4-cleft; COROLLA, *rotate* (wheel-shaped), 4-parted, one of these segments much smaller than the other three; PERICARP, a *capsule*, two-valved, compressed (flattened), two-seeded.

This character exactly applies to my plant; it is therefore named VERONICA.

Father.—It is called after a princess of that appellation, who is also a star in the heavens; and the English name is from its giving *speed* to the feet (*Speed-well*), namely, by aiding the lungs.

ANTHOXANTHUM.

Son.—I have here a beautiful grass. How fragrant it smells.

Father.—It is intirely owing to this grass that hay has so delightful a smell.

Son.—I should like much to know its name. It has two stamina and two pistilla. Hence it comes under Class II. Diandria; Order II. Digynia.

Father.—The discovery of this plant is most easy.

Son.—So it is; for in this class and order, I find in the *Vade Mccum* but two Genera, ANTHOXANTHUM Indigenouſ, and CREPSIS Exotic. Corolla, two-valved, awnleſs.

I. INDIGENOUS

ANTHOXANTHUM.

Gen. Char.—Sweet vernal Grass; CALYX, 2-valved; COROLLA, 2-valved, ſending out two *arista*; one of theſe *geniculate* (bent like the knee).

As I have found it in the fields, and the COROLLA is awned, I cannot hesitate to ſay my plant is the ANTHOXANTHUM *odoratum*, SWEET-SCENTED VERNAL GRASS, whoſe ſpike of flowers dries yellow, and is highly odoriferous. But I thought the graſſes belonged to Class III.

Father.—So they mostly do ; but here is an exception, which generally occurs when any plant has most extraordinary virtues.

Practice in Class III. TRIANDRIA.

CROCUS.

Son.—Let me examine this Crocus.

Father.—Do so.

Son.—It has three conspicuous stamina ; hence it comes under Class III. TRIANDRIA, and it has one pistillum ; hence it falls under Order I. MONOGYNIA. Having recourse to my VADE MECUM, I find seven English plants of this class and order. These plants are subdivided into two sections.

I. Flowers not resembling grass.

II. Flowers grass-like.

Of the first section are three plants only. The first is VALERIAN, without a calyx. The next is CROCUS.

CROCUS.

Gen. Char.—CALYX, a *Spatha*, one-leaved ; COROLLA, six-parted, segments equal ; *Stigma* of the PISTILLUM, convolute (rolled round), coloured, fragrant.

Such a description exactly applies to my plant, so that if I had not known its name, I should have found it.

Father.—This flower, so ornamental in our gardens, and which may have stolen from them into the fields, is seen along with the *Snow-drop* in the *Illustrations of Juvenile Botany*.

IRIS.

Son.—The discovery here is equally easy. It is the third of those flowers of this class and order, in Sect. II. not resembling grass, and is known by *CALYX*, a spathe.

IRIS.

Gen. Char.—*CALYX*, a spathe of two-leaves; *COROLLA*, six-parted, three alternate lacinae (*segments*), reflexed (bent back); broad, three, erect; more acute, smaller. *Stigmata*, very large, petal-form, concealing the *stamina*; summits, two-lipped; upper lip, two-cleft, reflexed. *Germen*, beneath the *corolla*. *PERICARP*, triangular, three-celled.

Father.—Let us again enter the hot-house.

PAPYRUS.

Son.—That tall reedy plant strikes my notice. I presume it falls under section, *Flowers grass-like*. Every leaf divides near its summit into four thread-like leaves, of the thickness of fennel.

Father.—Right.

Son.—To the Genus *CYPERUS*, I find this plant belongs, for it answers the generic character.

CYPERUS.

Gen. Char.—CALYX, none.—COROLLA, 2-valved, placed in double row.

Father.—One species of the CYPERUS, is called *Papyrus*. The leaf of this plant was first used for paper, whence the word *paper*; and leaf, or folium, for a fold of a book. Afterwards the bark of a species of mulberry was used; whence *liber* signifies a book, and the bark of a tree. Before the invention of letters mankind may be said to have been perpetually in their infancy, as the arts of one age or country generally died with their inventors. Whence arose the policy, which still continues in Hindostan, of obliging the son to practise the profession of his father. After the discovery of letters, the facts of Astronomy and Chemistry became recorded in written language, though the ancient hieroglyphic characters for the Planets and Metals continue in use at this day. The antiquity of the invention of Music, of Astronomical Observations, and the manufacture of gold and iron, are recorded in Scripture.

About twenty-four letters, ten cyphers, and seven crotchets, represent by their numerous combinations all our ideas and sensations! the

musical characters are probably arrived at their perfection, unless emphasis, and tone, and swell, could be expressed, as well as note and time.

Son.—Let us quit the hot-house, and enjoy for a time the cool breeze.

Father.—The change will be agreeable.

THE GRASSES.

Son.—These chiefly come under Class III. TRIANDRIA; Order 2, DIGYNIA.

Father.—Yes! Try your skill in distinguishing Barley (*Hordeum*) from Wheat (*Triticum*) and Oats (*Avena*).

Son.—I find in Order *Digynia*, three divisions.

Sect. I. CALYX, involving 1 flower.

Sect. II. _____ 2 flowers.

Sect. III. _____ 3 or more flowers.

It falls under the last division.

Flowers	{	Spiked, Calyx contains	}	HORDEUM.
		3 flowers, awn long.		
		Spiked Calyx contains	}	TRITICUM.
many flowers, awn				
		short.		
		Scattered, awn twisted.		AVENA.

The discrimination I now see is very easy.

Practice in Class IV. TETRANDRIA.

PLANTAGO.

Son.—In this meadow I observe a plant whose leaves are much ribbed, and the stamina are very thick and much clustered together.

Father.—Be careful in this investigation.

Son.—I was going to say it was of the Class XIII, Polyandria; but it may be a clustre of flowers.

Father.—Right, for a clustre does not constitute a compound flower, which have always their five anthers united.

Son.—I see then I must separate out one single flower, and examine it. This I will do, and I observe the anthers are placed upon very long slender filaments, which previous to the maturity of the anthers, lie closely doubled down within the corol to preserve them from injury until they are ready for expansion. In this state, it is curious to observe the unfolding of the filaments, if slightly assisted to escape with a fine needle.

PLANTAGO.

Gen. Char.—CALYX 4-paited. *Corolla* monopetalous, 4-cleft, border reflexed. STAMINA very long. CAPSULE 2-celled, opening longitudinally.

Such is the generic description, which corresponds to the plant, Ribwort, (*Plantago lanceolata*).

Practice in Class V. PENTANDRIA.

STRELITZIA.

Father.—Let us enter into the hot-house again. Here is a beautiful plant, called the *Queen Plant*, introduced into our stoves from Botany Bay, and named in honour of Her Majesty, a great patroness of Botany. Tell me its scientific name.

Son.—It has a *Spatha*, long, monophyllous, in length and shape resembling the beak of a large bird, common to several flowers, which flowers being of a bright red, look like the top-knots of a crane. It is filled with a glutinous matter. We take out one of the flowers, and find that it is composed of a *COROLLA*, monophyllous, three-parted, for the Corol is united at its base. The *Laciniae*, or Segments, end acute. In the centre is a purple body, very much resembling an anchor, of a dark purple, which I presume is the *Nectary*.

Father.—Where are the *Stamens*?

Son.—How curious are some of the contrivances of Nature! I find now the 5 *Stamina* are involved in this *Nectary*, and the beak of the anchor is the *stigma* of the *PISTILLUM*.

It comes then under Class V. PENTANDRIA,
Order I. MONOGYNIA.

Father.—The discriminating characters are,

STRELITZIA.

Gen. Char.—SPATHA, monophyllous, COROLLA, three-parted, and NECTARY, arrow-shaped, involving the *Stamina* and *Pistillum*.

Indicate sufficiently the STRELITZIA REGINE.

Son.—Certainly. This I find also represented in the *Juvenile Botanical Panorama*.

MEADIA.

Son.—Here is a beautiful clustre of flowers, the COROLLA is reflexed (rolled back) and the 5 stamens converge round the pistillum, giving an appearance of a parcel of shuttlecocks floating in the air, with their points downwards. Shall I be able easily to find out its name?

Father.—This flower much resembles the lovely *Cyclamen*. I should wish you to contrast the two.

CYCLAMEN.

Son.—Both have their COROLLAS, reflexed, and these are rotate, and the flowers much resemble a shower of rockets falling on the earth; but the *Cyclamen*, proceed single from

peduncles arising from the root; but the *Dodecatheon*, is an umbelliferous plant, and has its foliage and manner of growth so much resembling a *cowslip*, that it is called by the vulgar the *American Cowslip*.

Father.—It is called *DODECATHEON*, from its twelve flowers being thought worthy of the 12 heathen gods *δωδεκα*, twelve, and *Θεος*, God, and afterwards changed to *MEADIA*, in honour of Dr. Mead;—the *CYCLAMEN*, from *κυκλος*, a circle, from its large circular root, and *sow-bread*, from this affording food for swine.

COWSLIP.

Father.—How are the *PRIMROSE* and *COWSLIP* distinguished?

Son.—The former has, I remember, a funnel-shaped Corolla; and the latter a salver-shaped.

Father.—They are also distinguished, the one being like the *Meadia*, umbelliferous; whereas the latter, like the *Cyclamen*, has radical flowers.

Son.—The *rough-leaved plants*, *ASPERIFOLIA*, with naked-seeds, I find, from the *Vade Mecum*, belong to this Class V. Order I. *MONOGYNIA*.

Father.—They do.

Son.—And the *Umbellate* tribe of plants

(*umbellata*); but these come into Order 2, DIGYNIA.

Father.—These last require much care in inspection, being small: you will find them distinguished into three sections.

Sect. I. *A general, and partial Involucre.*

Sect. II. *A partial Involucre only.*

Sect. III. *No Involucre.*

DAUCUS.

Son.—Here is a fine example of an umbelliferous plant.

Father.—Please then to examine it.

Son.—I find it comes under the SECTION 1, a general and partial Involucre. When examining the *Gen. Char.* I find a description, which exactly applies to the plant I am examining.

DAUCUS.

Gen. Char.—The *Universal Involucre*, composed of leaves deeply pinnatifid, (i. e. deeply divided into transverse, lateral, oblong, small segments, or parts.) The umbel converging into the form of a concave cup.

It looks all the world like a *bird's nest*.

Father.—This is the *carrot* (DAUCUS) which when cultivated, produces so delightful a food.

Son.—Proud of this discovery, let me examine another plant of this difficult tribe.

Father.—Do so.

ÆTHUSA.

Son.—There is one without a general involucre. It falls under,

Sect. II. *A partial Involucre only*

Father.—Of this Section you will find only 8 plants.

Son.—The description of the first of these I find, exactly applies to my plant.

ÆTHUSA.

Gen. Char.—INVOLUCRES, three long, pendulous, leaves situate at the partial umbel only.

Father.—This is an useful discovery, as this plant is very poisonous, and the leaves so much resemble common parsley, that it is called *fool's parsley*. You have here an happy scientific discrimination.

APIUM.

Son.—Let us now examine the true parsley. I find this falls under

Sect. III. *No Involucre.*

APHUM.

Gen. Char. NO INVOLUCRE, or if a partial one, consisting of one leaf.

I think the FENNEL has also *no general, or partial Involucre.*

Father.—This observation is very just.

Practice in Class VI. HEXANDRIA.

TULIPA.

Son.—What a beautiful bed of *Tulips* are here!

Father.—These are only *varieties* of the same plant; the cultivated Tulip comes from the *Levant*, and the name is derived from its appearance to a *Turban*, TULIPAN, the Eastern Cap, which it resembles.

Son.—How is the wild Tulip?

Father.—The *Tulipa Sylvestris*, found in England, is of a *yellow colour*, and all its *petals* are *pointed*.

Son.—Let me scientifically examine this plant. I turn to my VADE MECUM.

TULIPA.

Gen. Char.—CALYX, none; COROLLA, hexapetalous (consisting of six petals), three internal, three external; GERMEN, crowned with a *sessile stigma*, three-cornered, that is, PISTILLUM, without a *style*.

Father.—Thus had you been ignorant of the plant in question, you would have at once known it to be the TULIPA.

Son.—How does this flower differ from the Lily (LILIUM).

Father.—You must surely have observed, in your VADE MECUM, that part of the *generic character* of the LILIUM is its possessing a *Nectary*, also a *style*; neither of which the TULIP possesses.

LILIUM.

Gen. Char.—CALYX, none; COROLLA, hexapetalous; PISTILLUM, composed of *germen*, *style*, and *stigma*. NECTARY, a *longitudinal line* in the *three inner petals*.

Father.—To facilitate the science, the orders are each subdivided into *sections*. Please to examine these sections.

SECT. I. *Flowers furnished with calyx, (not a spatha).*

SECT. II. *Flowers furnished with the calyx, (a spatha).*

SECT. III. *Flowers devoid of any calyx; (the COROLLA hexapetalous).*

In which section comes the TULIP.

Son.—Of this, Class VI. HEXANDRIA; Order I. MONOGYNIA; and SECT. III. there is no other plant, *without a style*, but the TULIP.

Father.—None.

Son.—Of the Lilies, have no other flowers, a *longitudinal nectariferous line*?

Father.—None.

Son.—I see now how easy it is to become a Botanist. But to return to the TULIP; please to describe the names of the different sorts.

Father.—This I will readily do, as they show the sportings of Nature, in variegating the petals of the corolla, rendering them, by certain colours, of great value.

Son.—What is the topmost Tulip; it has a most noble appearance?

Father.—It has the edges of its petals marked with mournful black, and is named LOUIS SEIZE (Louis XVI.), after that unfortunate French Monarch. Florists sell this Tulip for sixty guineas each.

Son.—What are the appellations of the two tulips on each side of the LOUIS.

Father.—The carnation looking Tulip, is called LE TRIOMPHE ROYAL, triumphing in beauty over all the rest. The right hand Tulip, is named the DUCHESS OF DEVONSHIRE.

Son.—What name has florists given to that beautiful Tulip, whose petals are so erect, and edged with a broad band of purple.

Father.—This is called the WASHINGTON, the establisher of the freedom of America.

————— Teuax propositi.

HOR.

Son.—What name has that yellow Tulip?

Father.—It is named GLORIA MUNDI, the glory of the World.

Son.—What, the middle Tulip at bottom?

Father.—HOME'S KING, from the first raiser of that tulip.

Son.—The last Tulip?

Father.—It is named EARL SPENCER, a great patron of science and of Botany.

Son.—Are varieties of flowers much esteemed by Botanists?

Father.—They look on Nature on the grand scale, so that by them the products of chance and cultivation are but little prized.

Son.—Let us now proceed to the consideration of that beautiful native of our own country, the SNOW-DROP: I should wish much to know its *scientific name*.

Father.—You observe it to come under,

SECT. II. *Flowers furnished with a spathe.*

Read in your VADE MECUM, the *Generic Characters* of those flowers which fall under this Section.

Son.—The first I find is

GALANTHUS.

Gen. Char.—SPATHE diphyllous, (composed of two leaves); COROLLA, tripetalous (composed of three petals); NECTARY, three petal-like, heart-shaped, tipped with green near the edges.

Characters which sufficiently denote GALANTHUS NIVALIS (*the Snow-drop*), the root of which is *solid bulb*, for such description applies to no other flower in the world, but to this plant the scientific name is from the Greek, γαλα, *gala*, milk, ανθος, *anthos*, a flower. Vide a beautiful Plate in the *illustrations* of this work.

Practice in Class VII. HEPTANDRIA.

ÆSCULUS.

Son.—I should wish to find out the scientific name of *Horse Chestnut*.

Father.—Examine then a single flower of its spike, or beautiful pyramid of flowers.

Son.—This I have done, and find it comes under Class VII. HEPTANDRIA; Order I. MONOGYNIA. In the VADE MECUM, I find in

SECT. I. *Flowers complete in all their parts.*

Four Genera. One of them is indigenous, TRIENTALIS (*Winter Green*), which reduces

the number to *three*, **ÆSCULUS**, **DISANDRA**.
JONESIA.

ÆSCULUS.

Gen. Char.—**CALYX**, 1-leaved, 5-toothed, bellied; **COROLLA**, inserted on the Calyx; **CAPSULE**, 3-celled.

Which description exactly applying to my plant, **ÆSCULUS**, is the scientific name of the *Horse Chestnut*.

Father.—Here is a flower in the hot-house which you will easily discover.

Son.—It has *seven* **PISTILLA**, therefore it falls into the Class VII. **HEPTANDRIA**; under Order IV. **HEPTAGYNIA**; and of this class and order I find but *one plant*.

SEPTAS.

Gen. Char.—All whose parts are made up of the number 7.

Practice in Class VIII. OCTANDRIA.

ERICA.

Gen. Char.—**ANTHERS** having two horns, or bifid; **CALYX**, 4-leaved; **COROLLA**, monopetalous, 4-cleft.

Father.—These are the characteristic marks of the **ERICA**, *Heath*, hence easily found.

Practice in Class IX. ENNEANDRIA.

Father.—This flower I present you will be found very easily.

Son.—Turning to my VADE MECUM, I find, Class IX. ENNEANDRIA, to contain only,

Order I. MONOGYNIA.

1. LAURUS (*Laurel*), and
2. ANACARDIUM (*Cashew Nut*).

Order II. TRIGYNIA.

3. RHEUM (*Rhubarb*).

Order III. HENAGYNIA.

4. BUTOMUS.

So that the investigation here is soon performed. The BUTOMUS, which I hold in my hand, is, I find, a native, and grows in our ponds, and it is called BUTOMUS *umbellatus*, the *large Flowering-Rush*, or *Water GLADIOLUS*.

Practice in Class X. DECANDRIA.

DICTAMNUS.

Son.—What plant is this I have picked up in the garden, which has so fragrant a smell?

Father.—Pray discover its name yourself. In the VADE MECUM are two sections:—

Sect. I. STAMENS *declined* (turned towards the Earth).

Sect. II. STAMENS *erect* (looking upwards to the Heavens).

Son.—My flower has its FILAMENTS turned downwards. Looking over the *generic characters*, I find one plant,

DICTAMNUS.

Gen. Char.—FILAMENTS sprinkled with *glandular dots*.

This I conceive to be a sufficient discrimination of the plant I wish to know, DITANY.

Father.—Just as the *proboscis* of an ELEPHANT, or *horn* on the nose of the RHINOCEROS, would be sufficient to discriminate those animals from all others; so do these dots designate the plant in question.

RUTA.

Son.—The *Rue* I should like next to examine. I find its *stamina* very curious; some of them are advancing towards, and others are receding from the female. Its chief generic character is very obvious.

RUTA.

Gen. Char.—GERMEN having honey-bearing dots.

KALMIA.

Father.—Did you ever see this plant before?

Son.—Never; but it is extremely beautiful. The *ten stamina* have their *filaments* bent like a bow, and the *anthers* are concealed in *ten* *notches* of the *Corolla*.

Father.—What is curious here, when the elasticity of the filaments have obtained their utmost stretch, each *stamen* leaps from its confinement, and ejaculates the farina on the *pistillum*.

Son.—I should like to see this.

Father.—I take therefore a pin, and gently press one of these bowed *filaments*, when you see it spirt out its farina to some distance.

Son.—I very much admire the contrivances of Nature. I will now try to investigate this plant.

KALMIA.

Gen. Char.—COROLLA rotundæ. NECTARIUM eii, being notches for the reception of the anthers.

Father.—There are two species, the *narrow*

and *broad-leaved*, usually found in our gardens, natives of the bogs in America.

Order II. DIGYNIA.

DIANTHUS.

Father.—Would you at once have discovered the *Dianthus* (PINK)?

Son.—I should from examining the Generic Character.

DIANTHUS.

Gen. Char.—SCALES at the base of the Calyx.

Son.—Why is it called DIANTHUS.

Father.—From *dis*, *dis*, two, and *ανθος*, *anthos*, a flower, because each stalk supports two flowers.

Practice in Class XI. DODECANDRIA.

Order II. DIGYNIA.

AGRIMONIA.

Gen. Char.—CALYX, five toothed, surrounded by an outer Calyx.

Son.—This is a British Plant, and the only one of that class and order, and therefore most easily discovered.

Order VI. DODECAGYNIA.

Is also extremely easy, possessing only

SEMPERVIVUM.

Gen. Char.—CALYX, twelve-parted ; PETALS twelve ; PISTILLAS twelve ; CAPSULES twelve.

Father.—This is our common *House-leek*. It is curious to observe here the stamina placed at first in two rows ; the six inner, advance first to the Pistillum, then the outer, and then they all retire, forming only one circle.

Practice in Class XII. ICOSANDRIA.

CACTUS.

Son.—What is the name of that most beautiful plant I see in the *hot-house*. How fragrant it smells. It opens only, I observe, at night.

Father.—Hence, it is called, the *Night-blowing Cereus*.

Son.—Its angular stem is armed with stellular prickles, and is devoid of leaves.

Father.—Hence it also has the name of *Torch Thistle* ; notwithstanding this, it is extremely succulent, and yet it requires no water to its root.

Son.—The CALYX, I observe, is *above* the *Germen*, or I might say *Germen beneath*.

Father.—Right.

Son.—The CALYX I see is of one piece, *monophyllous*; but it appears made up of numerous leaves, which however, are only multiplied *laciniæ*, or *segments*, which are of a fine orange colour.

Father.—Right.

Son.—The COROLLA is composed, on the contrary, of numerous petals, of a dazzling white.

Father.—Well observed.

Son.—The STAMINA are exceedingly numerous, and are seen rising up to cast the *Farina* upon the *Pistillum*.

Father.—These appear alive, being in constant motion in the plant.

Son.—The *Pistillum* has its *Germen* beneath, and is composed of a very long *style*, and a *stigma* consisting of twenty-one points.

Father.—The discovery of the scientific name of the plant, now will oblige me.

Son.—As the STAMENS are very numerous and arise from the body of the CALYX, it comes under Class XII. ICOSANDRIA. Order I. MONOGYNIA, and the first description applies to this plant, and no other.

CACTUS.

Gen. Char.—CALYX, monophyllous, above the *germen*, many-parted; COROLLA, composed of many leaves; BERRY, 1-celled, many-seeded.

It is called then CACTUS *grandiflora*, *large-flowering* CACTUS. Vide the Illustrative Plates to this work.

Father.—The chief fruits are of this class also.

AMYGDALUS.

Gen. Char.—Nut of the DRUPE, perforated with pores.

Son.—The *Almond* is thus very readily found.

Father.—It is a wise provision of Nature, that the *flowers* in this tree appear before the *foliage* in the Spring, whereas most others are fed and protected by their leaves. Mr. Knight, at the last Horticultural Meeting, exhibited a most delicious *New Peach*, raised by impregnating the *pistillum* of a sweet-almond flower with the *farina* of a common *Peach*, whose *Drupe*, being sown, produced this new fruit.

Order V.

PENTAGYNIA.

PYRUS.

Gen. Char.—PETALS five; *Fruit*, a POME.

Father.—This includes the PEAR and APPLE, and their varieties. Mr. Knight took the *farina* from a late Apple, and impregnated the *pistillum* of an early sort, and the result was an Apple, neither late or early, betwixt both.

Practice to Class XIII. POLYANDRIA.

CHELIDONIUM.

Son.—Here is a British plant; I have heard it called *Celandine*; I should wish to know its scientific name.

Father.—You will find it quickly by examining your VADE MECUM.

Son.—So I observe.

CHELIDONIUM.

Gen. Char.—COROLLA, four-petalled; a long linear, 1-celle; *Silqua*.

Father.—Is this the only plant of this class and order having a seed-vessel, a *silqua*?

Son.—No; as in the example.

SANGUINARIA.

Gen. Char.—A *siliqua*, ovate; COROLLA, 8-petalled

But these are the only two, and the distinction betwixt them is easily made.

PAPAVR.

Son.—Here is the *Poppy*, which I know, and this, I find, I should have easily discovered.

PAPAVR.

Gen. Char.—*Stigma* radiated, rising so as to disclose many openings for the escape of the seeds, when a *capsule*.

SARRACENIA.

Son.—This also would be at once known by having,

Gen. Char.—A *double CALYX*; *stigma* like a target, so large as to conceal the stamina.

Father.—It is called the *Pitcher-plant*, from its leaves resembling pitchers; also the *Side-saddle-flower*, from its resembling a lady's saddle.

Order III.

TRIGYNIA.

Son.—This order contains only two Genera. Here is the *Larkspur* and *Monk's-hood*; I would wish to know their scientific names.

DELPHINIUM.

Gen. Char.—NECTARY behind, horned

ACONITUM.

Gen. Char.—NECTARY 2, peduncled, recurved, concealed by the upper arch-like petal.

Son.—The distinction is extremely easy here.

Order IV.

TETRAGYNIA.

Here I find only one plant, *CIMIFUGA*, Bugwort.

Order V.

PENTAGYNIA.

Son.—Here we find two plants, with remarkable nectaries.

AQUILEGIA.

Gen. Char.—NECTARIES 5, horned, within the petals.

NIGELLA.

Gen. Char.—NECTARIES surrounding the corolla.

These then are very easily distinguished.

Order VI.

POLYGYNIA.

Son.—What a lovely plant is this I see in the water, in the hot-house?

Father.—It is a most extraordinary plant. Its leaves are like an inverted umbrella, and in their cavities the aquatic birds build their nests, and lay their eggs, the food of the inhabitants, where this plant grows. The root produces a *tuber*, similar to our potatoe, which boils as mealy, and is capable of being formed into bread.

Son.—The CALYX, I observe, is composed of four leaves. The COROLLA, like our Water Lily, consists of many petals, rosaceous, of a white colour, beautifully striped with red.

Father.—Like our water-lily, it closes in the evening at four o'clock, and expands with the sun the following morning.

Son.—Does it not dip under water in the evening?

Father.—So, it is said; but this supposed dipping probably arises from the fact, that

when the seeds are impregnated by the farina, the stem then dips with the seed-vessel, but not again to rise.

Son.—The STAMINA proceed from the receptacle, (not the calyx) upon which its classical character depends.

Father.—Now for the Pistillum.

Son.—I should be here puzzled, but I should think, that what the casual observers of Nature would call the *seed-vessel*, is the *receptacle*, of the shape of a top (turbinate) or truncate, also hollowed like an *honey-comb*, in each cell of which is seated the pistillum, whose germen turns into a naked seed.

Father.—Having thus studied this plant, could you not find out its scientific name?

Son.—I am sure I could; thus in the VADE MECUM, I soon discover under Order VI. POLYGYNIA.

NELUMBIUM.

Gen. Char.—CALYX four-leaved. COROLLA, many leaved. SEEDS naked in an honey-comb, conical receptacle.

Father.—It is not a NYMPHÆA.

Son.—See the definition of LINNÆUS, which is as follows,

NYMPHÆA.

Gen. Char.—CALYX, of four or five leaves; PETALS many; STYLE 0. BERRY hard, many-celled, *truncated*, filled with pulp.

Father.—This applies to the NYMPHÆA *Lutea* (yellow Water Lily), but the seed vessel of the *white* more resembles the POPPY; so also with the LOTOS of Egypt, which is blue, and which very much resembles our Water-Lily. But here the Pistillas are numerous, whereas in the others, there is but *one* PISTILLUM, hence this is a *new genus*, called NELUMBUM, and falls under Class XIII. Polyandria. Order VI. Polygynia of LINNÆUS.

RANUNCULUS AND ADONIS.

Father.—How is the RANUNCULUS (*Crow-foot*) and ADONIS (*Pheasants' eye*) distinguished?

Son.—In each the CALYX is five-leaved; PETALS five or more. The difference consists in the NECTARY.

ADONIS.

Gen. Char.—No nectariferous scale.

RANUNCULUS.

Gen. Char.—At the base of each petal a nectariferous scale.

HELLEBORUS.

Gen. Char.—Calyx none; a NECTARY, bilabiate; in a circle, tubular. The *white petals* of the COROLLA turn green.

CALTHA.

Gen. Char.—Calyx none. No NECTARY.

Such are the nice and just discriminations made by LINNÆUS.

Practice in Class XIV. DIDYNAMIA.

Order I. GYNOSPERMIA.

Sect. I. CALYX five-cleft, segments subequal.

LAMIUM.

Gen. Char.—A tooth at each margin of the throat.

Father.—The *Lamiums* have all this character, which runs throughout the species.

Order II. ANGIOSPERMIA.

Sect. I. STIGMA simple, COROLLA personate.

ANTIRRHINUM.

Gen. Char.—The base of the Corolla prominent behind, nectar-bearing.

Son.—This is what we call *Snap-dragon* ?

Father.—It is.

Sect. II. COROLLA *not personate.*

CELSIA.

Gen. Char.—COROLLA rotate; 2 of the filaments barbate (bearded).

DIGITALIS.

Gen. Char.—COROLLA subringent; ventricose (bellied).

Father.—In this manner are plants of this class and order readily distinguished.

Son.—I perceive the science of Botany is most beautiful in every part.

Father.—Another division is into

Sect. III. STIGMA, *double.*

The other two sections having a simple stigma.

Son.—Let us examine this plant.

MIMULUS.

Gen. Char.—CALYX 4 tooth, prismatic, declined. STIGMA double.

This is sufficient to determine for me this plant, as there is no other plant so circumstanced but this flower. Why is it called **MIMULUS**?

Father.—**MIMULUS**, whence our word *mimic*, means *Monkey Flower*; because the Calyx being of a glutinous nature, the flowers are seen in all directions, from adhering to the stem, imitating the grotesque attitudes of that animal. The **MIMULUS glutinosus**, is a greenhouse plant.

Son.—I observe another plant I would wish much to investigate.

ACANTHUS.

Gen. Char.—**CALYX** having three-pair of leaflets
STIGMA double.

Father.—This is the famous plant used in architecture, as an ornament to the Corinthian column.

Practice in Class XV. TETRADYNAMIA.

Order I. SILICULOSA.

Son.—Here is a plant I have often gathered for my canary-bird, called *Shepherd's purse*; I will try to discover its scientific name.

THLASPI.

Gen. Char.—SILICLE narrowed at the base; emarginate (heart-shaped)

Father.—Right.

Son.—Here is another plant; I have heard it called *Candy-Tuft*. I will find it out.

IBERIS.

Gen. Char.—COROLLA irregular; with the two exterior petals the largest.

Father.—Proceed now to the

Order II. SILIQUOSA.

Son.—Let me examine this plant I have often eat, tasting like *Asparagus*, the *Sea kale*; the gardener was not able to tell me its scientific name.

CRAMBE.

Gen. Char.—FILAMENTS four, long, *two-forked* (bifurcate), two prongs only, anther-bearing.

Father.—The plant then is the *CRAMBE maritima*, and comes from the sea-coast.

Son.—Let me examine the difference betwixt the *MUSTARD* and *CABBAGE*.

SINAPIS.

Gen. Char.—CALYX spreading out, nearly horizontal.

BRASSICA.

Gen. Char.—CALYX erect, conniving (embracing the Corolla).

Father.—You have well-determined this, and must have observed the varieties of the last plant, the Cabbage. A curious fact relative to this plant is recorded in Ray's *Historia Plantarum*, vol. I. p. 42. One RICHARD BAAL, a gardener at *Breatford*, became remarkable for a fine species of this tribe. In consequence he obtained large orders for the seed, which he sold for a great price, *cauliflowers* being then an object of luxury. He cultivated a large field near his house, but unfortunately for him, his wife had a garden contiguous, and not contented with the *cauliflower* production, raised in her garden all kinds of cabbages, as *savoys*, *broccoli*, and the *red cabbage*, for pickling, &c., the consequence was, that the *cauliflower seed*, sold as such by BAAL, produced *savoys*, *broccoli*, some *red cabbages*, some *striped*, in short, all the *different sorts*, and their *intermixtures*. In consequence the gardeners in a body commenced a suit against him in Westminster Hall,

and he was condemned, not only to return the money raised for the seeds, but also for the ground, so long encumbered. Had any one of the judges, or council, or jury, known the sexes of plants, this innocent man would not have been ruined in his fortune and wealth, for he soon died a martyr to chagrine, having lost his money, and reputation, and being thrown into prison, where he perished unjustly, for this seeming fraud arose from the proximity of the *culinary cabbages* raised in his wife's garden: for the famous MILLER, as he relates in his *Gardener's Dictionary*, says, he sowed all the different kinds of cabbages, and cut down all but one sort, and from the seeds of this, he obtained all the varieties of cabbages and hybrids, or intermixtures, of all the sorts: but another year having separated the different sorts of cabbages by an high paling purposely erected, each sort produced only its own kind.

A new cabbage is described in the Bath Agriculture, vol. i. art. 4. which is said to fatten a beast six weeks sooner than *turnips*. It is there said, "that the sort of cabbage principally raised, is the *tallow-loaf*, or *drum-headed cabbage*; but it being *too tender* to bear sharp frost, I planted some of *this sort* and the *common purple-cabbage* used for pickling, (it being the *hardiest* I am acquainted with) alternately; and

when the seed-pods were perfectly formed, I cut down the *purple*, and left the other for seed. This had the desired effect, and produced a *mixt stock* of a deep green colour with *purple veins*, retaining the size of the *drum head*, and acquiring the *hardiness* of the *purple*.”

In another curious paper of the Bath Society, vol. v. p. 38. Mr. Wimpey relates, that he planted a field with garden-beans in rows about three feet asunder in the following order, *mazagan*, *white-blossom*, *long-podded*, *Sandwich-toker*, and *Windsor-beans*. The *mazagan* and *white-blossom* were thrashed first, when to his great surprise he found many new species of beans; those from the *mazagan* were mottled black and white; the *white blossoms* were brown and yellow instead of their natural black; and they were both much larger than usual.

Mr. Knight has given us a curious experiment of his impregnating the stigmas of the pea-blossoms of one variety with the farina of another. He says, Vide his Treatise on the Apple and Pear, p. 42. “The *pistils* of a small white garden-pea, in which the *anthers* had previously been destroyed, were impregnated with the farina of a large clay-coloured kind with purple blossoms. The produce of the seeds thus ob-

tained were of a dark grey colour, but these having no fixed habits, were soon changed by cultivation into a numerous variety of very large and extremely luxuriant white ones; which were not only much larger and more productive than the original white ones, but the number of seeds in each pod was increased from seven to eight, to eight or nine, and not unfrequently to ten. The newly made grey kinds I found were easily made white again by impregnating their blossoms with the farina of another white kind. In this experiment the seeds, which grew towards the point of the pod, and were by position first exposed to the action of the male, would sometimes produce seeds like it in colour, whilst those at the other end would follow the female.

“ In other instances the whole produce of the pod would take the colour of one or other of the parents; and I had once an instance in which two peas at one end of a pod produced white seeds like the male, two at the other end grey ones like the female, and the central seeds took the intermediate shade, a clay colour. Something very similar appears to take place in animals, which produce many young ones at a birth, when the male and female are of opposite colours. From some very imperfect experiments I have made, I am led to suspect that

considerable advantages would be found to arise from the use of new or regenerated varieties of wheat, and these are easily obtained, as this plant readily sports in varieties, whenever different kinds are sown together."

This practice of the very ingenious Mr. KNIGHT is not, however, a new one, for it was recommended by BRADLEY as far back as 1736.

"By this knowledge," says Bradley, "we may perhaps alter the property and taste of any fruit, by impregnating the one with the *farina* of another of the same class: as, for example, a *Codlin* with a *Pearmain*, which will occasion the *Codlin* so impregnated to last a longer time than usual, and be of a sharper taste; or if the winter fruits should be fecundated with the dust of the summer kinds, they will decay before their usual time: and it is from this accidental coupling of the *farina* of one with the other, that in an orchard where there is variety of *apples*, even the fruits gathered from the same tree differ in their flavour and times of ripening: and moreover, the seeds of those *apples* so generated, being changed by that means from their natural qualities, will produce different kinds of fruit, if they are sown.

"It is from the accidental couplings, that pro-

ceed the numberless varieties of fruits and flowers which are raised every day from seed. The yellow and purple *Auriculas*, which were the first we had in England, coupling with one another, produced seed which gave us other varieties; which again mixing their qualities in like manner, have afforded us, by little and little, the numberless variations which we see at this day in every curious flower garden; for I have saved the seeds of near an hundred plain *Auriculas*, whose flowers were of one colour, and stood remote from others, and that seed I remember to have produced no variety: but on the other hand, where I have saved the seed of such plain *Auriculas* as have stood together, and were differing in their colours, that seed has furnished me with great varieties, different from the mother plants. I believe I need not explain how the male dust of plants may be conveyed by air from the one to the other, by which this generation and production of new plants is brought about; but I shall hint, by-the-hye, to such as plant orchards for cider, that they ought to plant only one sort of *apple* in those orchards; and that such plantations be likewise remote from other kinds of *apples*, whose *farina* would else certainly spoil the cider-fruit, by ripening some sooner and others later, which would occasion almost a

continual ferment in the liquor, and never permit it to settle or grow fine.

“ Moreover, a curious person may, by this knowledge, produce such rare kinds of plants, as have not yet been heard of, by making choice of two plants for this purpose, as near alike in their parts, but chiefly in their flowers or seed-vessels: for example, the *Carnation* and *Sweet-William* are in some respects alike; the *farina* of the one will impregnate the other, and the seed so enlivened will produce a plant differing from either, as may now be seen in the garden of Mr. Thomas Fairchild of Hoxton, a plant neither *Sweet William* nor *Carnation*, but resembling both equally, which was raised from the seed of a *Carnation* that had been impregnated by the *farina* of the *Sweet William*. These couplings are not unlike that of the *mare* with the *ass*, which produces the *mule*; and in regard to *generation*, are also the same with *mules*, if of different kinds, not being able to multiply their species, no more than other monsters generated in the same manner.

“ We may learn from hence, that the fruit of any tree may be adulterated as well by the *farina* of one of the same sort, which perhaps may be sickly, and of a dwarf kind, as by the dust of some other kind near akin to it, and worse than itself. Now, as such couplings may

be very frequent in common woods, so would I recommend the choice of seed to be made only from such plants or timber-trees as excel in greatness, or other good qualities, and are far distant from others of meaner sorts, which might degenerate their seeds, and cross our expectations when they come to grow up; and this is as necessary to be observed among *vegetables*, to maintain their good qualities in the *young plants* they are to produce, as it is in the breeding of *game-cocks*, *spaniels*, or *running-horses*."

There is an apple described in Bradley's work, which is said "to have one side of it a sweet fruit, which boils soft, and the other side a sour fruit, which boils hard." This Mr. Bradley, so long ago as the year 1721, ingeniously ascribes "to the germe of one of these apples impregnating the other; which would seem the more probable, if we consider, that each division of an apple has a separate cell, and may therefore have a separate impregnation, like puppies of different kinds in one litter. The same is said to have occurred in oranges and lemons, and grapes of different colours.

I have seen myself a curious instance of a *Nectarine Tree* produce its fruit half *Nectarine* half *Peach*.

Practice in Class VI. MONADELPHIA.

Son.—In this class I expect to find the GERANIUM.

Father.—So it is; but these are by modern Botanists separated into different orders.

Son.—Some I find to possess *five stamina*.

Father.—These L'Heritier calls ERODIUM (*Heron's Bill*).

Son.—Some I find possess *seven stamina*, and these fall under Order II. PENTANDRIA. Pray what are these called?

Father.—PELARGONIUM (*Stork's Bill*), and fall under Order III. HEPTANDRIA.

Son.—Others possess *ten stamina*; these then of course fall under Order V. DECANDRIA, and are called the true GERANIUM. Is this division proper?

Father.—By no means, as it tends to multiply names, encumbering the memory, for they all possess the same generic character.

Order V. DECANDRIA.

GERANIUM.

Gen. Char.—STAMINA 5, 7, or 10. One PISTILLUM; 5 STIGMAS; CAPSULE, beaked, 5-celled, 5-seeded.

The discovery here is very easy, as the first flower, HUGONIA, has a *berry*, the CONNARUS, a *capsule*, 1-celled, and the third is a *beaked capsule*, like the bill of a Crane, hence called *Crane's-bill* (GERANIUM).

Order IV. POLYANDRIA.

Father.—Shew me the difference of these *three* genera.

- I. MALVA (*Mallow*).
- II. ALTHÆA (*Marsh-Mallows*).
- III. HIBISCUS (*China-Rose*).

Son.—I examine my *Vade Mecum* for the generic characters, and find

MALVA.

Gen. Char.—CALYX, two; the *exterior* 3-leaved.

ALTHÆA.

Gen. Char.—CALYX, two; the *exterior* 9-cleft.

HIBISCUS.

Gen. Char.—CALYX, two; the *exterior*, many-leaved.

The discrimination here then is easy, it being from the *exterior* CALYX.

Practice in Class XVII. DIADELPHIA.

Father.—This class contains, you recollect, the *Papilionaceous Flowers* (FLORES PAPILIONACEI).

Order I. PENTANDRIA.

Contains only one plant, MONNIERIA.

Order II. HEXANDRIA.

Contains also, only one plant, FUMARIA (*Fumatory*).

Order III. OCTANDRIA.

Has only 2 plants, { POLYGALA (*Milkwort*),
and SECURIDACA.

Order III. DECANDRIA.

This divides into

Sect. I. Such as have *monadelphous* FILAMENTS (all the filaments united at the base).

Sect. II. STIGMA pubescent, STAMENS *diadelphous*.

Sect. III. LEGUMES, subbilocular.

Sect. IV. LEGUMES, one, or two-seeded.

Sect. V. LEGUMES sub-articulate.

Sect. VI. LEGUMES one-celled, many-seeded.

Son.—Here is a plant I know by name, but would wish to understand it scientifically.

Father.—Do so.

Son.—I should at once have known it from its striking generic character. It comes under Sect. I. and by right, should fall under Class XXI. MONADELPHIA.

Father.—This would occasion a dreadful revulsion of this Natural Order.

Son.—I am glad to find it where it is.

LUPINUS (*Lupine*).

Gen. Char.—5 oblong ANTHEES, and 5 round ANTHEES.

Does no other flower in this class, order, and section, possess this character but the LUPINE?

Father.—None; upon such beautiful nice observations, do many of the *Generic Characters* depend.

Son.—Here is the PEA; let us examine this: it falls into the second section.

PISUM (*Pea*).

Gen. Char.—Style triangular, above keeled. The 2 upper *laciniæ* of the CALYX, shortest.

Hence I should have soon discovered the name of this flower.

Father.—The *Bean* also falls into this second section; tell me its scientific name.

PHASEOLUS (*Kidney-Bean*).

Gen. Char.—The *CARINA* with the *stamens* and *style* twisted spirally like a shell.

Son.—This, then, is readily discovered.

In Sect. III.

ULEX (*Furze*).

Gen. Char.—*CALYX* 2-leaved; the *LEGUME* scarcely longer than the calyx.

I should have also found out this, as no other plant in that section has a *Calyx* composed of *two* leaves.

Father.—When the *Legume* is ripe, it explodes with a loud noise, ejecting its seeds.

In Sect. IV.

The *LEGUMES* are very remarkable.

ORITHOPUS (*Bird's-foot*).

Gen. Char.—*LEGUME*, jointed, smooth, spirally incurved.

Son.—How it resembles the foot of a bird!

SCORPIURUS (*Caterpillars*).

Gen. Char.—LEGUME intercepted with partitions, recurved, revolute, smooth.

MEDICAGO (*Snails*).

Gen. Char.—LEGUME compressed, like a snail.

Son.—The English names are very appropriate, and SCORPIURUS means *Scorpion-tail*, which it also resembles; and MEDICAGO is the Latin name for a *Snail*.

Son.—Here is a British plant, called ST. FOIN, I shall wish to know its scientific name.

Father.—Consult your *Vade Mecum*.

HEDYSARUM.

Gen. Char.—KELL of the COROLLA transversely obtuse. WINGS very short. POD roundish, prickly, containing one seed, seven pair of leaflets, ending with an odd one.

Son.—The *St. Foin* is then called HEDYSARUM *Onobrychis*.

Father.—There is one remarkable species of this genus, the HEDYSARUM *Gyrans*, or self-moving plant, which has *two leaflets* at the base of the other leaves, which are always in motion, sometimes bending down, sometimes

turning to the side, as if it had real life; and in the hottest day, and in a perfect calm, this motion still continues.

Son.—The *Trefoil* also arranges here.

Father.—Yes.

TRIFOLIUM (*Trefoil*).

Gen. Char.—Flowers in a round head. VEXILLUM reflex. Flowers, when impregnated, depending.

It is called so from its having only three leaves.

Practice in Class XVIII. POLYADELPHIA.

Order I. DECANDRIA.

One genus only THEOBROMA (*Chocolate Nut*).

Gen. Char.—Each filament bears 5 anthers.

Father.—Such is the plant which produces our *Chocolate*, called by botanists, THEOBROMA, from θεος, of the Gods, βρομα, food (food worthy of the Gods).

Order II. DODECANDRIA.

Has two genera,

1. BUBROMA.
2. ABROMA.

The first from $\epsilon\alpha\varsigma$, *an o.c.*, and the second from α , *not*, and $\epsilon\rho\omicron\mu\alpha$, *food*.

Order III. ICOSANDRIA.

Here we find the

CITRUS (*Orange, also Lemon and Citron*).

Gen. Char.—A POME, 9 or 11-celled.

Order IV. POLYANDRIA.

Father.—Are the *St. John's Wort* (HYPERICUM), and *St. Andrew's Wort* (ASCYRUM).

Son.—How are these discriminated?

Father.—Pray examine your *Vade Mecum*.

HYPERICUM.

Gen. Char.—CALYX, 5-parted; petals 5; filaments many, in 5 phalanges (bundles).

ASCYRUM.

Gen. Char.—CALYX, 4-leaved; petals 4; filaments many, in 4 phalanges.

Son.—I observe, in the former, the number 5 predominates; in the latter, the number 4; and I see that Botany hitherto is very easy.

Practice in Class XIX. SYNGENESIA.

Order I. POLYGAMIA ÆQUALIS.

Father.—This Order is divided into the following Sections:

Sect. I. FLORETS *ligulate*.

Sect. II. FLORETS *tubular*.

Sect. III. FLORETS *discoid*.

Let us examine the *British Plants* of this class.

Son.—What is the plant I see here?

Father.—Consult your *Vade Mecum*.

TRAGOPOGON (*Goat's-beard*).

Gen. Char.—CALYX of 8 leaves, united at the base. PAPPUS feathered, with 30 radii.

Son.—It is the TRAGOPOGON (*Goat's-beard*.)

Father.—What is this plant?

PICRIS (*Ox-tongue*).

Gen. Char.—CALYX double, interior imbricated, exterior composed of 5 leaves.

Father.—This, then, is easily discovered.

Son.—Here is a plant I know, the *Dandelion*.

Father.—Observe its *Generic Character*.

LEONTODON (*Dandelion*).

Gen. Char.—CALYX imbricated, inner leaves or scales *linear*, upright; exterior, few, deflexed (bent down). PAPPUS feathered, styped. Margins of the scales solid.

Son.—Why is this last character given?

Father.—To distinguish it from

SCORZONERA (*Viper's-grass*).

Gen. Char.—Margins of the scales of the imbricated CALYX *membranaceous*.

Son.—Here is one with *tubular Florets*; I recollect it well, throwing it sometimes into the hairs of my fellow play-mates; it is called BURDOCK.

Father.—What is its scientific name?

Son.—The first plant I see arranging under this second Section is,

ARCTIUM (*Burdock*).

Gen. Char.—CALYX globose, imbricated; scales terminating with strong inflexed hooks.

ARCTIUM LIAPPA is the scientific name, and I now see the reason why it gets entangled in the hair. By this method its seeds are dispersed.

Father.—Examine now the *Thistle*.

CARDUUS (*Thistle*).

Gen. Char.—CALYX ovate, imbricated; scales each terminating with a straight spine.

Son.—I admire the nice little distinctions which distinguish one plant from another.

Father.—Examine next the common *Artichoke*.

CYNARA (*Artichoke*).

Gen. Char.—CALYX large, dilated, imbricated; scales square, and fleshy at bottom, each ending *tricuspid*, with 3 points, the shortest in the centre.

Son.—This I shall now notice. Pray, what is this I see here?

BIDENS (*Bur Marygold*).

Gen. Char.—Seeds terminated by two long, erect, *cough*, ARISTA.

Father.—The scientific name you now know; it is from BIS, *two*, and DENS, *a tooth*.

We come now to,

Order II. POLYGAMIA *Superflua*.

Sect. I. FLORETS *discoïd*.

Sect. II. FLORETS *radiate*.

Father.—In the first Section of Florets, *dis-*
coid, or *flosculous* (having no ray), comes

ARTEMISIA (*Wormwood*).

Gen. Char.—RECEPTACLE subvillous; PAPPUS none; CALYX imbricated; scales roundish, *conniving*.

Son.—Why lay so particular a stress on the word *conniving*?

Father.—See the next plant in this Section.

GNAPHALIUM (*Cotton-weed*).

Gen. Char.—*Receptacle* naked; PAPPUS feathery; CALYX imbricated; scales, after flowering, *expanded*.

Son.—I see now the propriety of this last very nice observation.

Father.—Let us now examine the second Section, the *radiate*, or rayed flowers.

Son.—Here is the GROUNDSEL, which I sometimes give as food to my canary-bird.

Father.—Examine its characters.

SENECIO (*Groundsel*).

Gen. Char.—CALYX double; scales equal, and so close as to seem one, with scales at the bottom having all their ends as if dead.

Son.—This last observation pleases me

much: none but a Botanist would have noticed this little particular.

Father.—Compare the next two English plants, *ASTER* (*Star-wort*), and *SOLIDAGO* (*Golden Rod*).

ASTER (*Star-wort*).

Gen. Char.—Inferior scales of the *CALYX*, spreading; florets in the ray, more than 10.

SOLIDAGO (*Golden-rod*).

Gen. Char.—Scales of the *CALYX* all curved inwards; florets in the ray usually 5.

Son.—What is this curious plant I see?

INULA (*Elecampane*).

Gen. Char.—Anthers possessing at their base *bristles* (*setæ*).

Father.—The *INULA* (*Elecampane*) has this obvious discriminating character.

Son.—We come now to the beautiful *Daisy*.

Father.—Please to examine its character.

BELLIS (*Daisy*).

Gen. Char.—*RECEPTACLES* a cone. *CALYX* hemispherical. *SCALES* in a double row; all of them alike. Florets in the ray numerous, entire.

Son.—How is this *Common Daisy* distinguished from *Ox-eye Daisy*?

Father.—This last is not a daisy at all: it is called by botanists,

CHRYSANTHEMUM (*Golden Flower*).

Gen. Char.—The interior scales gradually larger, the marginal ones membranaceous. Florets in the ray not more than 12, three-toothed.

Son.—I see they are different, not in size only, but in character.

Order III. POLYGAMIA *Frustranea*.

Father.—The only indigenous plant coming under this Class and Order is the *CENTAUREA*, which you have often observed in corn-fields, and made of them a beautiful garland: I shall now wish you to examine it scientifically.

CENTAUREA (*Blue-bottle*).

Gen. Char.—The *Florets* of the *RAY* large, funnel-shaped, and irregularly divided into several segments. The *RECEPTACLE* setaceous (having bristles). *PAPPUS* simple.

Son.—This flower I see at once is called the *Blue-bottle*. Why is this?

Father.—As the large florets of the ray have something of that appearance.

Son.—I have observed that the scales of the calyx have their margins beautifully fringed.

Father.—This is true: but some species of this genus have their scales spinous.

Son.—Why mention in the Generic Character the RECEPTACLE being *bristly*, and the PAPPUS *simple*?

Father.—Because in the HELIANTHUS (*Sunflower*), RUDBECKIA, and COREOPSIS, the receptacles are *chafy*; and in the HELIANTHUS, the Pappus is actually *2-leaved*; in the RUDBECKIA, *4-toothed*; and in the COREOPSIS, *2-horned*.

Son.—I see more and more the beauty of the generic distinctions of plants.

Order IV. POLYGAMIA *Necessaria*.

Father.—Here we have, as *indigenous*, only *one genus*.

FILAGO (*Cudweed*).

Gen. Char.—*Female florets* productive, scarcely visible among the scales of the calyx.

Son.—Here is, however, the CALENDULA (*Marygold*).

Father.—It is esteemed not a native, but was stolen from our gardens into the fields.

CALENDULA (*Marygold*).

Gen. Char.—CALYX many-leaved, equal. SEEDS in the disk membranaceous, those in the ray perfect.

Order V. MONOGAMIA.

Father.—Here are four *English* plants; please to discriminate them.

Son.—This I can soon do. I shall first examine the descriptions in the *Generic Characters* of the CALYXES of these four plants.

CALYX 1-leaved . . . 1. LOBELIA.

CALYX 2-leaved . . . 2. IMPATIENS.

CALYX 5-leaved . . . 3. VIOLA.

CALYX 10-leaved . . . 4. JASIONE.

I might also have taken the COROLLAS, and *other* PARTS.

COROLLA 1-petalled 1. LOBELIA.

COROLLA 5-petalled	} irregular	{	A STYLE.	2. VIOLA.
			NO STYLE.	3. IMPATIENS.
	} regular	{		4. JASIONE.

Father.—Thus are all flowers easily discriminated, and the plants of this Class are supposed to be the most difficult to determine:

but this can apply only to the incurious and lazy, which I rejoice to find you are not.

Practice in Class XX. GYNANDRIA.

Order I. MONANDRIA.

Father.—The *Orchises* fall into this class and order, but here is a beautiful plant.

Order II. DIANDRIA.

CYPRIPEDIUM.

Gen. Char.—The NECTARY greatly inflated, ventricose, hollow.

Son.—I recollect it is called *Ladies'-slipper*.

ORDER III. TRIANDRIA.

Son.—What is that beautiful flower whose petals are so regularly striped?

Father.—You must find this out yourself.

Son.—Of this class and order I observe but two flowers.

SISYRINCHIUM.

Gen. Char.—SPATHA, 2 leaved; PETALS, 6.

FERRARIA.

Gen. Char.—SPATHA, 2-leaved ; PETALS, 3 ; NECTARIES, 3 ; petal-like, with *an hollow cup* at the base of each Nectary-leaf.

I cannot, therefore, hesitate to say, that the plant in question is the *SISYRINCHIUM striatum* (*streaked Sisyrinchium*), from Mexico ; the other of course must be the *FERRARIA tygrida* (*Tyger FERRARIA*).

Order IV. TETRANDRIA.

Possesses but one genus, *NEPENTHES* (*Pitcher-Plant*), called *distillatoria*, as it supplies the thirsty mariner with a clear limpid water.

Order V. PENTANDRIA.

Contains the *PASSION-FLOWERS*, and *AYENIA* ; the former of which has *three pistilla*, the latter but *one* : but the best distinction is the *Nectary*.

PASSIFLORA.

Gen. Char.—CALYX, 1-leaved, 5-parted ; PETALS, 5 ; PISTILLAS, 3 ; NECTARY, *a crown*.

Order VI. HEXANDRIA.

Here we have but one genus.

ARISTOLOCHIA (*Birthwort*).

Gen. Char.—CALYX, none; COROLLA, monopetalous, tongue-shaped, entire; CAPSULE, 6-celled, beneath.

Father.—This plant is a native of this country, and we may here remark, that one of the most singular ways of the fecundation of plants through insects, we have in the ARISTOLOCHIA CLEMATITIS (*Common Birthwort*). It has a linguiform corolla, which at its inferior part is spherical, towards the top it becomes long and tubular, and its margins end in a flat and spear-pointed extremity. The *pistil* is placed in the round cavity of the corol, the *germen* of which is surrounded by *six anthers*, which are shorter than the germen itself. The germen has no style, but is provided with an hexagonal stigma, which is very shallow, and on its upper surface has imbibing pores. *The anthers cannot empty the pollen upon the stigma, as the flower stands always straight (upright) during the period of flowering.* The pollen therefore must necessarily fall to the bottom of the flower without being used, if *no insects* came near the

flower. And indeed if it be tried, and all insects kept from the flower by a thin, but firmly closed piece of gauze, no seeds will be formed. It happens indeed not unfrequently, that as it is a particular insect which impregnates this flower, when it is wanting or not able to find the flower, this last withers without having a single seed. This insect is the *TIPULA PENNICORNIS*. The round bottom of the flower is, in its interior, quite smooth; but the tubular extremity is lined with dense hair, every one of which is turned towards the interior, so as to form a kind of funnel, through which the insect may very easily enter; but cannot without great difficulty return, and is obliged to remain in the cavity. Uneasy to be confined in so small a space, it creeps constantly to and fro, and so deposits the pollen on the stigma. After this is done, the flower drops, the hair, which obstructed the passage, shrinks and adheres closely to the sides of the flower; by which means the insect gets free. Who but must admire this wise provision of Nature in fecundating this seemingly trifling flower!

Order VII. OCTANDRIA.

Has only one genus, *SCROPOLIA*.

Order VIII. DECANDRIA.

In HELICTERES (*Screw-tree*), from the CAPSULE being twisted like a screw.

Order IX. POLYANDRIA.

Father.—How is the ARUM known from the CALLA, both flowers of this class and order?

ARUM (*Cuckow-pint*).

Gen. Char.—SPATHA hooded, point incurved; SPADIX above, having STAMENS without anthers, called NECTARY; the ANTHERS all clustered together, above the females.

CALLA.

Gen. Char.—SPATHA flat, the point turned downwards; the ANTHERS and PISTILLAS intermixed.

Son.—Hence the distinction is very easy.

Practice in Class XXI. MONŒCIA.

Son.—In this class, Nature seems to advance in her art, and to form flowers of *distinct sexes*; here she hath placed them upon the *same plant*.

ORDER I. MONANDRIA.

Contains *our* pond-weeds ZANICHELLIA and CHARA, and also the famous *Exotic* ARTOCARPUS (*Bread-fruit tree of the South Seas*), which has an edible fruit, size of a small loaf, tasting exactly like new bread. Captain COOK, who discovered this valuable tree, says, that a father has only in his life to plant one of these trees, and there is bread enough for many generations, so abundant is its produce.

Order II. DIANDRIA.

Possesses our LEMNA (*Duck-weed*).

Order III. TRIANDRIA.

Has the ZEA (*Maize*).

Father.—Some experiments on this plant deserve your notice. There is a work entitled, “*Experiments and Reflections on the Generation of Plants*, by JAMES LOGAN, President of the Council, and Chief Justice of the Province of Pennsylvania,” which was published in 1739. From this Essay I shall extract what the ingenious author has related respecting the Maize, or Indian Corn.

“As several doubts had formerly occurred to me in respect to the reported generation

of plants, when I first read of the *Farina fecundans*, or impregnating dust, I conceived great hopes that these would be easily solved, and the whole of this intricate affair receive considerable light from experiments. And as I had long ago observed, with surprise, the singular way of growth of our Indian Wheat or Maize, I judged it, of all the plants I had seen, or perhaps of any that Nature produces, the most proper for experiments of this kind.

“ Indian Wheat grows to the height of six, eight, and sometimes ten feet. At the top of the stalk it bears a thready tuft or tassel (called by MALPIGHI, *Muscarium*), furnished with *apices*, which yield the *farina*. From the joints of the stalk below, the ears grow out, which are six, eight, ten, and sometimes even twelve inches long. These consist of a pretty solid substance, about an inch thick, set quite round with grains regularly disposed in rows, in a very beautiful manner. Generally there are eight such rows, often ten, sometimes twelve; and I once saw sixteen: there are commonly forty grains in each row, more or less; which, in their first rudiments, and whilst the stalk they grow upon is soft and tender, may justly be called the *ova* or eggs: to each *ovum* there adheres a white, fine, smooth thread, which, excepting that it is hollow, resembles a thread

of silk. These threads are disposed one by one in order, betwixt the rows from that end where the ear rises from the stalk to the other, where they creep from under the case that incloses the ear, and make their appearance, in the open air, in a bundle or skein: their colour in this part is mostly whitish, though sometimes a little yellow, red, or purple, according to the nature of the plant they grow from: these threads, as I formerly suspected, are the real *Styles* of the eggs.

“ Intending therefore to make some experiments on this plant, towards the end of April I planted four or five grains on hillocks, as is usual in sowing maize, in each corner of a little garden I had in town, which was about forty feet wide, and eighty long. About the beginning of August, when the plants were full grown, and the tufts on the top, and the ears on the stem, had acquired their full extent, I cut off these tufts from every plant on one hillock. On another, without meddling with the tufts, I gently opened the leaves that covered the ears, and cut away from some all the styles, and then closed the leaves again; from others a quarter part, from others one half, and from others three quarters, and left the rest untouched. I covered another ear, before the skein of styles appeared out of the case, with a

piece of very fine and soft muslin, but so loosely, that its growth could not be injured; and whilst the furzy texture of the muslin suffered it to receive all the benefit of the sun, air, and showers, the *farina* was effectually secluded. I left the plants on the fourth hillock, as I did these, except in the circumstances above-mentioned, unmolested, till they were fully ripe.

“ After the beginning of October, when it was time to inquire into the success of my experiments, I made the following observations. In the first hillock, where I had cut off all the tufts, the ears, whilst they remained covered with their husks, looked indeed very well, but were small, and felt light when handled; and not one perfect grain to be found in them, except in one large ear, which grew out somewhat farther from the stalk than usual, and on that side too which faced another hillock in a quarter from whence our strongest winds most commonly blow: in this ear alone I found about twenty grains which were full grown and ripe. I attributed this to some *farina* brought by the wind from a distant plant. In those ears from which I had plucked off some of the styles, I found just so many ripe grains as I had left styles untouched. In those covered with muslin, not one ripe grain was to

be seen: the empty or barren eggs were nothing but mere dry husks.

“ From these experiments, which I made with the utmost care and circumspection, as well as from those made by a great many other persons, it is very plain that this *farina*, emitted from the summits of the stamina, is the male principle, and absolutely necessary to render the grain fertile. A truth which, however certain, yet was unknown till the present age: the discoverer of this grand secret of Nature, therefore, ought ever to be remembered with due applause. Sir Thomas MELLINGTON, sometime Savilian Professor, seems *first* to have taken notice of it, before or about the year 1676, according to the account which Dr. GREW gave, in a lecture read before the Royal Society the 9th of November the same year. (See GREW's Works, p. 161 and 171) MALPIGHI no where, that I know of, mentions its use. And GREW himself, though he allows it necessary for fecundation, yet did not suspect that it passed to the *germen*: but M. MORLAND, about twenty years after, asserted ‘ that it passed to the *germen* through the canal of the style.’ (See Phil. Trans. No. 287.) I once only saw a small grain in the middle of this canal; nor is it to be doubted, but that stricter

inquiries will discover more of them passing the same way."

The CAREXES, SPARGANIUM (*Bur-reed*), and TYPHA (*Bull-rush*), all are fine examples of this order.

Order IV. TETRANDRIA,

Contains the URTICA (*the nettle*), BUXUS (*box-tree*), ALNUS (*alder*), and lastly, MORUS (*our mulberry-tree*).

Order V. PENTANDRIA,

Contains our AMARANTHUS (*Amaranth*).

Order VI. HEXANDRIA.

ZIZANIA (*Rice*), COCOS (*Cocoa nut-tree*), and SAGUS (*the Sago-palm*).

Order VIII. POLYANDRIA.

In this class and order fall QUERCUS (*the oak*), JUGLANS (*the walnut*), FAGUS (*the beech*), CASTANEA (*the Chest-nut, commonly called the Spanish*), BETULA (*the birch*), CARPINUS (*the horn-beam tree*), CORYLUS (*the hazel*), PLATANUS (*the plane tree*).

Son.—It is singular that this class and order should contain so many trees.

Father.—This subject we shall resume, when we come to the palms and trees in the next class.

Son.—Our SAGITTARIA (*Arrow-head*) is also of this class and order.

BEGONIA.

Father.—In the hot-house I notice a most beautiful plant.

Son.—It is indeed a most extraordinary one, for it seems to have two sorts of flowers on it, one kind has *four* petals, the other *five*.

Father.—Please to examine them.

Son.—I see that in the centre of these flowers are different organs. The flower with *four* petals possesses only *stamens*. This is then the *male flower*. That with *five* petals possesses *three pistillas*, without *stamens*, and is therefore the *female flower*. Viewing the backs of the *male flower*, there are no signs of seed-vessel, whereas in the female, the seed-vessel is beneath, that is under the corolla.

It comes then under this Class XXI. MONŒCIA (*one habitation*), and Order VII. POLYANDRIA (*many stamina*).

Father.—What is its generic character?

Son.—It is thus designated:

BEGONIA.

Gen. Char.—*Male flower.* PETALS four, 2 large, obcordate (heart-shaped), 2 lanceolate. *Female flower,* PETALS five, all lanceolate. PISTILLAS 3. STIGMAS two-pronged (like an horseshoe). PERICARP, a Capsule, triangular, winged.

This then is the *oblique-leaved* BEGONIA (BEGONIA nitida) from Jamaica.

Father.—It flowers from May to December, and is called *oblique-leaved*, from an oblique cutting of its leaf, and NITIDA, from the *shining* of the upper surface of the leaves. The following experiment was made with it. All the *male flowers* which occupy the top, and are in clusters, were removed. The *females*, which are on dichotomous (forked) peduncles, below, fell to the ground abortive. The next year the same experiment was made, and only *one male flower* was brought to *one female*; this single flower continued, and produced ripe seeds, and thus any chosen number were rendered prolific by artificial impregnations.

Order VIII. MONADELPHIA,

Contains the PINUS (*the Pines, Fir, and Larch*), forming our deals; the CUPRESSUS

(*Cyprus*), an imperishable wood; THUJA, (*arbor vitæ, the tree of life*); CROTON (*the Tallow-tree*); RICINUS (*the palma Christi*) which furnishes us castor oil; the ARECA (*Cabbage-tree*), and HURA (*Sand-box tree*) from the purpose for which it is used, also called *crepitans*, from their bursting with a report, as loud as a pistol.

Order IX. SYNGENESIA.

Contains the MOMORDICA (*squirting Cucumber*), so called, from its pome, when pressed by the fingers, spirting its seed into the face; CUCUMIS (*the Cucumber and Melon*), and CUCURBITA (*the Pumpkin and Gourd*).

Son.—How are these three last distinguished?

Father.—The first by its remarkable property, the second by the seeds having their margins acute, and the third their margins rounded, besides the other generic characters to be found in your VADE MECUM.

Son.—Does not the *Cucumber* furnish a very striking example of the sexes of plants?

Father.—Yes! as this plant produces on the same trailing branches flowers *male* and *female*; that is, some of the flowers have only *stamina* (no *pistillum*), and others again only the

pistilla (without the *stamens*), and being cultivated under glass for *early* produce, it is a known fact, that gardeners are obliged to pluck the *males*, or *stameniferous* flowers, and place them in the corollas of the *females*, or *pistiliferous* flowers. This process is thus celebrated by the illustrious COWPER in his poem called "The Garden."

*Plants have their sexes, and when Summer shines
The BEE transports the fertilizing meal
From flower to flower, and e'en the breathing air
Wafts the rich prize to its appointed use.
Not so when Winter scowls. Assistant art
Then acts in Nature's office, brings to pass
The glad espousals, and ensures the crop.*

COWPER.

Linnæus says, "several species of MOMORDICA (*Squirting Cucumber*) which are cultivated with us, like other *Indian vegetables*, in close stoves, have there very frequently produced *female flowers*, and these, although at first very flourishing, in a short time have begun to wither, nor have they produced seed, until I instructed the gardener, as soon as he should discover a *female flower*, to pluck a *male*, and place it over the *female flower*. By this art, for a certainty, we have produced

fruit, and such is our present confidence, that we could pledge ourselves to make *any female flower* fixed upon, *fertile*."

Father.—The effects arising from the assistance of art, are not only proved by this common practice on the Cucumber, but also from experiments instituted by Linnæus, which are thus related by him.

FIRST EXPERIMENT.

In the month of January of this year the ANTHOLYZA CUNONIA (*Scarlet-flowered Antholyza*), a plant of the third class, flowered in a pot placed in the window of my dining-room, but it produced me *no fruit*, because the confined air had not power to waft the *farina* to the *stigmas*.

Observing about midday *one of the stigmas* very *ἀκρωγ*, I plucked off, by means of a fine pair of forceps, an *anther*, and gently brought it into contact with it. The spike remained eight or ten days longer adorned with flowers.

Then, indeed, cutting the stem in order to preserve it as a specimen in my herbarium, I observed a *fruit* in *that single flower*, over which I had placed the *anther*, which had swollen to the size of a bean.

SECOND EXPERIMENT.

The IXIA CHINENSIS (*Chinese Ixia*), a plant of the third class, first order, flowered in the stove, the windows being shut, and all the flowers had *abortive fruit*.

I therefore took away the *anthers* from the flowers of another IXIA, and with these I sprinkled *two of the flowers*, and the following day only *one stigma* of a *third flower*.

The *germina* remained only in these *three flowers*, which swelled and bore *seed*; but, indeed, the *fruit* was in *one* of these three matured only in *one cell*.

THIRD EXPERIMENT.

The exterior *petals* of the ORNITHOGALUM (*Star of Bethlehem*), a plant of the sixth class, first order, so closely connive, that although they admit air to the germen, they scarcely suffer the intrusion of the farina arising from another flower. This daily presented new flowers furnishing fruit, nor did fecundation fail in any one instance. I therefore carefully, with a bent hook, removed the *anthers* from a *single flower*, and, as I had expected, it happened, that *this single flower proved abortive*.

After eight days I repeated the same experiment, and with a similar result.

FOURTH EXPERIMENT.

The *NICOTIANA FRUTICOSA* (*Shrubby Tobacco*), a plant of the fifth class, first order, was growing in a garden pot, and produced flowers and fruit most abundantly.

From a flower newly opening, I extracted the *anthers* which had not yet burst, and removed at the same time all the other flowers.

The *germen* here neither produced a fruit, nor swelled.

FIFTH AND SIXTH EXPERIMENTS.

The *ASPHODELUS FISTULOSUS* (*Onion-leaved Asphodel*), a plant of the sixth class, first order, growing in an urn, I removed to one corner of the garden, and from one of the flowers which opened on that same day, I withdrew the *anthers*.

Hence that *germen* proved *abortive*.

On another day I repeated the same experiment, and by using a flower furnished from

another quarter of the garden, I sprinkled the *pistillum* of this with its *farina*.

Hence this *germen* proved *fruitful*.

SEVENTH AND EIGHTH EXPERIMENTS.

From a *CHELIDONIUM CORNICULATUM* (*Scarlet-horned Poppy*), a plant of Class *Polyandria*, Order I. *Monogynia*, growing in a remote quarter of the garden, I removed all the *anthers* in a flower which first appeared, and then carefully plucked away all the rest of the flowers.

On another day I made a similar experiment, but over the *pistillum* of this last I sprinkled the *farina* taken from another flower of the same species.

The result was, that the *first flower* produced *no seed*.

From the *second experiment* I obtained *perfect fruit*.

In this manner Mr. Lee, at his nursery at Hammersmith, obtains his valuable foreign seeds, which before were very rarely productive in his different hot-houses: a peach-tree, artificially impregnated, produced infinitely more than one not so served.

NINTH AND TENTH EXPERIMENTS.

The *JATROPHA URENS* (*Stinging Jatropha*) flowers every year in my hot-house, but the *female flowers* have preceded the *males*, and before eight days they lost their petals, and faded, before the *male flowers* were expanded.

Hence not only they produced *no fruit*, but the *flowers* themselves *dropt*.

Thus it happened that, until the year 1752, we could obtain *no fruit* of the *JATROPHA*.

But in this year, the *male flowers* were in vigour upon a taller tree, at the precise time the *females* appeared on a small *JATROPHA* growing in a pot.

This pot I placed under the tree producing *male flowers*, and in this manner I accomplished, that the *female flowers* produced *seed*, which, being sown in the earth, grew.

Two years after, I placed these *male flowers* under a piece of paper, until the *Farina* had fallen upon it, which I preserved rolled up, if I recollect right, for four or five weeks, when this same *JATROPHA* on another branch produced *female flowers*.

Then I sprinkled that *Farina* so long pre-

served in paper upon *three flowers*, the only one at that time expanded.

These *three female flowers only* became fruitful, whereas *all the other flowers* which appeared in the same corymbus fell off abortive.

The same experiment was made on the *JATROPHA IMPERIALIS* (*Imperial Jatropha*), and with exactly the same result. The *male flowers* usually occupy the upper part of the plant, and are soon to be distinguished from the *females*.

I have frequently since amused myself by taking the *male farina* from one plant, which by sprinkling upon the *females* of another, I have always found the seeds thereby rendered fruitful.

Practice in Class XXII. DIOECIA.

Order I. MONANDRIA.

Son.—This contains two plants, *NAJAS*, and *PANDANUS* (*the Screw-Pine*).

Order II. DIANDRIA.

The first in appearance is *VALISNERIA*, an aquatic plant.

This extraordinary plant is found in the East Indies, in Norway, and various parts of Italy. *Lin. Spec. Plant.* The roots are seen at the bottom of the Rhone; the flowers of the female plant float on the surface of the water, and are furnished with an elastic spiral stalk, which extends or contracts as the water rises and falls; this rise or fall, from the rapid descent of the river, and the mountain torrents which flow into it, often amounts to many feet in a few hours. The flowers of the male plant are produced under water, and as soon as their farina, or dust, is mature, they detach themselves from the plant, and rise to the surface, continue to flourish, and are wafted by the air, or borne by the currents to the female flowers. In this resembling those tribes of insects, where the males at certain seasons acquire wings, but not the females, as *Ants*, *Coccus*, *Lampyris*, *Phalæna*, *Brumata*, *Lichanella*. These male flowers are in such numbers, though very minute, as frequently to cover the surface of the river to a considerable extent.

Then comes the **WILLOWS** (*SALICES*).

The flowers are in an *AMERT*, and appear before the leaves, and look beautifully *yellow*, from the number collected together, and are vulgarly called *Gulls*.

The females have a downy appearance, and

produce a pappous seed, in order for their escape to the opposite shore.

Besides these two, this Order contains **CROCIPHA** (*Trumpet tree, or Snake-wood*) from Jamaica, and the **BORYA**.

Order III. TRIANDRIA,

Contains our **EMPETRUM**, (*Crake-berry*), and the **PHŒNIX DACTYLIFERA** (*Date-bearing Palm*).

Father.—The Date-tree (the *Phœnix Dactylifera* of Linnæus) is a native of Africa, and the eastern countries, where it grows to fifty, sixty, and one hundred feet high. The trunk is round, upright, and studded with protuberances, which are the vestiges of the decayed leaves. From the top issues forth a cluster of leaves or branches, eight or nine feet long, extending all round like an umbrella, and bending a little towards the earth. The bottom part produces a number of stalks like those of the middle, but seldom shooting so high as four or five feet. These stalks, says Adanson, diffuse the tree very considerably; so that, wherever it naturally grows in forests, it is extremely difficult to open a passage through its prickly leaves. The flowers are male and female upon different roots. The dates, which

are the produce of the female plant, grow in large spiral clusters, each being about the bigness and shape of a middling olive, and containing within the pulp, which is of a yellow colour, and agreeable taste, a round, strong, hard nut or stone, of an ash-colour, marked with a deep furrow running lengthwise. Of the fresh dates and sugar, says Hasselquist, the Egyptians make a conserve, which has a very pleasant taste. The kernels or stones, though hard as horn, they grind in hand-mills, and in default of better food, give to their camels. Of the leaves are made baskets, or bags, which are much used in Turkey on journies, and for other economical uses. In Egypt they are used as fly-flaps, for driving away the numerous insects, which prove so troublesome in hot countries; and Rauwolfi relates, that of the fibres of the leaves, and covering of the fruit, are spun ropes, of pretty large dimensions and considerable strength. The hard boughs are used for fences, and other purposes of husbandry; the principal stem for building; in fine, no part of this curious tree wants its use. The fruit, before it is ripe, is somewhat astringent, but when thoroughly mature, is of the nature of the fig. The Senegal dates are shorter than those of Egypt, but much thicker in the pulp, which is

said to have a sugary agreeable taste, superior to that of the best dates of the Levant.

Professor Milius's Letter to Dr. Watson, dated at Berlin, February 20, 1750.

“ The sex of plants is very well confirmed, by an experiment that has been made here on the *palma major foliis stabelliformibus*. There is a great tree of this kind in the garden of the Royal Academy. It has flowered, and bore fruit these thirty years, but the fruit never ripened, and when planted, it did not vegetate. The palm-tree, as you know, is a *planta diœcia*; that is, one of those in which the male and female flowers are found to be upon different plants. We having, therefore, no male plants, the flowers of our female were never impregnated with the farina of the male. There is a male plant of this kind in a garden at Leipsic, twenty German miles from Berlin. We procured from thence, in April, 1745, a branch of male flowers, and suspended it over our female ones; and our experiment succeeded so well, that our palm-tree produced more than an hundred perfectly ripe fruit; from which we have already eleven young palm-trees. This experiment was repeated last year, and our palm-tree bore above two thousand ripe fruit. As I do not remember a

like experiment, I thought it convenient to mention it to you; and, if you think proper, be pleased to communicate it to the Royal Society."

As the subject is very interesting, I shall add a fuller account of the Palm from the most authentic sources.

"The *Palm-tree* grows very high, forming one stem.—A sort of bough shoots out, and bears the fruit in a kind of sheath, which opens as it grows. The *male* bears a large bunch something like millet, which is full of a white flower, and unless the young fruit of the *female* is impregnated with it, the fruit is good for nought; and to secure it, they tie a piece of this fruit of the male to every bearing branch of the female. Strabo observes, that the *Palm-tree* in Judea did not bear fruit, as at present; which probably may be owing to their not having the *male tree*; concerning which, I could get no information. But the fruit of the *female tree*, without the male, drops off, or comes to no perfection." Vide Pocock's Description of the East, vol. i. 206.

"On the morning of the 21st, I had the pleasure of seeing from my window one of the most remarkable sights in nature. A *female palm* (*Phœnix dactylifera* Linnæi) had in the

night put forth its blossoms from the spatha ; I went thither at sun-rise to see it, whilst the dew was yet falling. I saw a gardener, the proprietor of the palm, climbing up the palm, which equalled our largest firs in height. He had a bunch of *male flowers*, with which he powdered the female, and by these means fecundated them." Vide Hasselquist's *Voyages and Travels in the Levant*, English Transl. p. 112.

“ The first thing I did after my arrival in Egypt, was to see the *Date-tree*, the ornament and a great part of the riches of this country. It had already blossomed, but I had, nevertheless, the pleasure of seeing how the *Arabs* assist its fecundation, and by that means secure to themselves a plentiful harvest of a vegetable, which was so important to them, and known to them, many centuries before any botanist dreamed of the different sexes in vegetables. The gardener informed me of this before I had time to inquire, and would shew me, as a very curious thing, the *male* and *female* of the *Date* or *Palm-tree* ; nor could he conceive how I, a Frank, lately arrived, could know it before ; for, says he, all who have yet come from Europe to see this country, have regarded this relation either as a *fable* or a *miracle*. The Arab, seeing me inclined

to be further informed, accompanied me and my French interpreter to a *Palm-tree*, which was very full of young fruit, and had by him been wedded or fecundated with the *male*, when both were in blossom. This the Arabs do in the following manner: when the *spadix* has a *female flower* that comes out of its *spatha*, they search out a tree that has *male flowers*, which they know by experience, for a *spadix* which has not yet burst out of its *spatha*: this they open, take out the *spadix*, and cut it lengthways in several pieces, but take care not to hurt the flowers. A piece of this *spadix*, with *male flowers*, they put lengthways between the small branches of the *spadix* which hath *female flowers*, and then lay a leaf of a Palm over the branches. In this situation I yet saw the greatest part of the *spadices* which bore their young fruit; but the *male flowers* which were put between were withered. The Arabs besides gave me the following anecdote: First, unless they, in this manner, wed and fecundate the *Date-tree*, it bears no fruit. Secondly, they always take the precaution to preserve some unopened *spathæ* with *male flowers*, from one year to another, to be applied for this purpose, in case the *male flowers* should miscarry or suffer damage. Thirdly, if they permit the *spadix* of the *male flowers* to burst

or come out, it becomes useless for fecundation : it must have its *male dust* (these were the words of the Arab), which is lost in the same moment the blossoms burst out of their case. Therefore the person, who cultivates Date-trees, must be careful to hit the right time of assisting their fecundation, which is almost the only article in their cultivation. Fourthly, on opening the *spatha*, he finds all the *male flowers* full of a liquid, which resembles the finest dew ; it is of a sweet and pleasant taste, resembling much the taste of fresh dates : but much more refined and aromatic : this was likewise confirmed by my interpreter, who hath lived thirty-two years in Egypt, and therefore had opportunities enough of tasting both the nectar of the blossoms, and the fresh dates.

“ Thus much have I learned of this wonderful work of Nature, in a country where it may be seen every year. I shall have the honour to give a relation of the use, and divers other qualities of the Date-tree, at some other opportunity.” Vide Hasselquist’s Letters to Linnæus.

“ In one of our excursions we had an opportunity of observing a curious process in the vegetable world. It has already been observed by naturalists, but is too uncommon to be known to readers of every class. The *Date-*

trees were now in blossom; and we remarked the Arabs to be busied about the branches. It is necessary to ingraft all fruit-trees to obtain good fruit; but the propagation of the Date is in another manner, and intimately resembles that of the animal creation. There is a *male* as well as a *female* Date-tree, which are distinguished from each other by the colour and shape of the blossoms. The *male-tree* yields no fruit; but the gardener must be careful, every spring, to cull as many blossoms from the *male* as will serve his purpose. One of these at least he must inwrap and bind up in the blossom of the *female-tree*; without which she will prove as barren as the *male*." Vide Irwin's Series of Adventures in the Course of a Voyage up the Red Sea. 8vo. Edit. 1787.

SONNINI, the latest traveller in Egypt, gives us the following account of the uses of the Date-tree :

" Among the trees of Egypt there is none more widely dispersed than the *Date-tree*: it is every where to be found, in the Thebais and in the Delta; in the sands as well as in the cultivated districts. Although it requires little culture, it yields a considerable profit, on account of the immense consumption of its fruit. The date varies in quality; that which is produced in the environs of Rosetta is delicious,

and boats are laden with it for the market of Cairo.

“ To climb trees which have no branches but at their top, and the straight and slender stem of which cannot support a ladder, the Egyptians employ a sort of girth fastened to a rope, that they pass round the tree. On this girth they seat themselves, and rest their weight; then with the assistance of their feet, and holding the cord in both hands, they contrive to force the noose suddenly upwards, so as to catch the rugged protuberances with which the stem is symmetrically studded, and formed at the origin of the branch-like leaves, that are annually cut. By means of these successive springs, the people of this country reach the top of the *date tree*, where sitting, they work at their ease, either impregnating the females, or gathering the clusters of fruit: they afterwards descend in the same manner.

“ The *dates* are not the only produce of this species of Palm-tree; from hard beating its bark, its branch-like leaves, as well as the rind of its clusters of fruit, threads are obtained, from which are manufactured ropes and sails for boats. The leaves serve likewise for making baskets and other articles. The very long rib of the branches, or leaves, is called in Arabic *dsjerid*. From its combined lightness and solidity, it is employed by the Mamalûks, in their

military exercises, as javelins, which they throw at each other from their horses when at full speed." Vide Sonnini's Travels into Egypt, 4to. Ed 1800, p. 400.

Since this period, a knowledge of Botany has introduced the practice of ingrafting boughs producing male flowers on the tops of the female plant, so that a **DIOECIOUS** palm, is now rendered by art, of the Class **MONGECIA** (*one habitation*), which saves all this infinite trouble and labour.

Son.—I find the study of Botany not only *very amusing*, but also *very useful*.

Order IV. TETRANDRIA,

Contains our Misseltoe (**VISCUM ALBUM**), and the *great nettle* (**URTICA DIOICA**).

Father.—Such is the abundance of farina, that about the male plant, it is often seen like a cloud hanging around it.

Order V. PENTANDRIA.

Son.—This order possesses our **HUMULUS** (*Hop*), the *Spinach of the Garden* (**SPINACHIA**), the *Pistachia Tree* (**PISTACHIA**), and the *Hemp* (**CANNABIS**).

Father.—These plants afford the best arguments in favor of plants being male and female.

Unless some male *Hops* be placed amongst the female plants, the seeds are unproductive; the same may be said of the *Spinach*, and we have often seen gardeners, ignorant of this subject, extremely active in extirpating the male *unproductive* plants, as being wholly useless; whereby all the seeds have been withered, and when sown, never vegetated. Of the *Pistachia Tree* (PISTACHIA TEREBINTHUS), we have the following account from various authors. The *Turpentine Tree*, the TEREBINTHUS INDICA of THEOPHRASTUS, p. 401, is thus mentioned by Pliny. “Syria TEREBINTHUM habet. *Mascula* est sine fructu. *Fæminarum* duo species; alteri fructus ruber lentis magnitudine, alteri pallidus.”

“In Syria is produced the *turpentine tree*. The *male* bears no fruit. The *female* is of two kinds, the one has red grains of the size of peas, the other sort produces a pale fruit.” PLIN. BOOK XIII. CHAP. IV.

This would be decisive, as proving Pliny’s knowledge of the sexes of plants, but *unfortunately* for him, there is found in the same book, the following passage :

“Etiam Rhus Syriæ *mascula* fert. sterili *fæmina*.”

“Also in Syria is produced the *Rhus*, or

Sumach, the *male* of which bears fruit, but the *female* is barren."

Bocconi, who wrote in 1697, notices the *male* and *female* TURPENTINE TREE. "E perche in sacca et in Agrigento osservai due albere di Pistacchi, differenti una dall'altero, e distinti dai paesani contitudo do *maschio* et *femina*." "I observed in Agrigentum two trees of the Pistachia, or Turpentine Tree, differing from each other, which the peasants distinguish by the title of *male* and *female*."

I shall produce now a modern authority.

"In the garden of the Austin Friars I saw several large PISTACHIA *nut-trees*, called in Sicilian, *Scornabocco*, and the fruit, *Fastugo*. These trees are of Linnæus's Class DIOECIA, Order PENTANDRIA, and produce *male* and *female* flowers upon different distinct plants. The latter prove barren and useless, unless rendered fruitful by the aspersion of the *farina* from a *male* plant, and, therefore, the purpose of fecundity can only be answered by trees of *different sexes* being set near each other. In these gardens are many of the *female* kind, and only one of the *male*, which has small, oblong, blunt leaves, of a dusky green, the flowers thick and in bunches; the *female* blossoms are more scattered, the leaves larger, harder and rounder, and of a lighter colour. The *male* flowers

first, and some gardeners pluck them when shut, dry them, and afterwards sprinkle the dust over the *female* tree. But the method usually followed in Sicily, when the trees are far asunder, is to wait till the *female* buds are open, and then to gather bunches of the *male* blossoms ready to blow; these are stuck into a pot of moist mould and hung upon the *female* tree, till they are quite dry and empty; this operation is called *Tuchiare*, and never fails to produce fructification." Vide Swinburne's Travels, Vol. iii. page 386. 2d Ed. 8vo. 1790.

I cannot forbear relating here a ridiculous story respecting the *Turpentine Tree* (*PISTACHIA TEREBINTHUS*) recorded with great gravity by Duhamel.

In the garden of Mons. DE LA SERRE, in the Rue de St. Jaque at Paris, there grew a *female* TURPENTINE TREE, which flowered every year, but which furnished him no fruit capable of vegetation. This was a very sensible mortification to the opulent owner, who being ignorant of the doctrine of the sexes of plants, had laboured very hard to obtain an increase of that tree.

Mess. DUHAMEL and JUSSIEU very properly took away all blame from the elements, and promised him they would soon procure

him the pleasure he desired. They sent him a *male* TURPENTINE TREE, which was very much loaded with blossoms. It was according to their direction planted near to the *female* TURPENTINE TREE. "That year it produced a great quantity of fruit well conditioned, and such as, when planted, rose with facility. Being removed, his *female* TURPENTINE TREE became barren as before."

"Some gardeners in Sicily," according to SWINBURNE, "have ingeniously contrived the art of *budding* the *male* tree upon the *female*, by which means the two *sexes* are placed together upon the *same* tree."

Son.—Have any more experiments been made with plants of this class?

Father.—LINNÆUS relates the following experiments which he made with the HEMP.

"In the month of April I sowed HEMP-SEED (*Canabis*) in *two* pots.

"The young plants came up in such abundance, that each pot contained thirty or forty plants.

"I placed *both* to the light on a window-seat, but in opposite parts of the house, so that all communication was necessarily prevented.

"In *both* situations the HEMP flourished greatly.

"In *one* of the pots I suffered the *male* and

female plants to grow together, to flourish, and produce fruit which was ripe in the month of June, and afterwards being macerated in water, and committed to the earth, shot up within twelve days.

“ But in the *second* I plucked up all the *male* plants as soon as they had advanced, so that I could discern the *anther-bearing* males from the *pistil-bearing* females.

“ The surviving *females* indeed flourished, and copiously presented their long pistils, but the flowers remained a very long time, as if all that length of time in expectation of marriage; so that in the mean time in the *other pot* the fruit had reached maturity, and the *pistils*, in a quite different way, had instantly faded, after the *males* had discharged their *farina*.

“ Undoubtedly this is a pleasing sight, and very much to be admired, that the *unmarried* females in so opposite a way retained their *pistillas* green and flourishing, nor first allowed these to collapse, before that they had been a very long while exposed in vain for the access of the *male farina*.

“ And, lastly, when these *virgin* plants began to be affected with age, I diligently searched along with several botanists for all the calyxes, and I found these large and flourishing, but the

seeds, as many as were found, were yellow, compressed, membranaceous, dry, not exhibiting the slightest trace of cotyledons or pulp, nor would any of them, when committed to the earth, grow."

Order VI. HEXANDRIA.

This possesses *Black Bryony* (TAMUS), and the beautiful Fan-palm (BORASSUS *flabelliformis*), whose large leaves so much resemble a fan.

Order VII. OCTANDRIA.

Has the Poplar, and trembling Aspin Tree (POPULUS *alba et tremula*), whose feathered seeds dispersing in the air, look like the scattering of the feathers of birds. It has also one other genus only, the RHODIOLA (*Rose-root*.)

Father.—This last plant flourished in the garden at Upsal 30 years, without producing seeds. A male plant, says Linnæus, being procured, and placed near the female, it produced that year plenty of seed, which, when sown, vegetated. When removed, the female plant became barren as before.

Order IX. ENNEANDRIA.

Son.—Has also only two genera, MERCURIALIS (*Dog's Mercury*), and HYDROCHARIS

(*Frog's-bit*), both indigenous. Have any experiments been made with these plants?

Father.—SPALANZANI, a philosopher of the highest character, after numerous experiments on *bisexual* flowers, where he found that removing the anthers produced always barrenness of the seeds, proceeded upon those plants which staggered ALSTON. Like that professor, he sometimes experienced a contradiction to the general doctrine, but shews it to arise from an accident not very uncommon in unisexual flowers, viz. the occasional production of two kinds of flowers. "It has been observed," says Spalanzani, "by Linnæus, Haller, Duhamel, and others, that male flowers are not very infrequently found upon female individuals: a root of spinach, of which I shall now speak, furnished me with a remarkable instance; and the hemp is subject to the same accident, as I was informed by Mr. Bonnet, in a letter dated August 15, 1778. The letter gave me notice of an experiment which he undertook upon hemp, after I had communicated mine to him. The paragraph to which I allude is the following: "I began this year some experiments upon hemp. I have followed the method which I employed for rearing the insects on plants in solitude. My plants were

covered with large tubes of glass, hermetically sealed at the top, and with the bottom sunk in the earth. But fortune did not favour me—instead of a female I had a male plant in one instance, and in another a plant of great expectation, after putting forth many flowers with pistils, produced some with stamina, close to the former, which totally disconcerted the experiment."

Speaking of the *spinach* he found the same thing. "In one of my daily visits to my three plants, I perceived upon one individual an unexpected combination of male and female flowers, growing close together, and forming very elegant groups. The blossoms with pistils were very conspicuous, but those with stamina were so little advanced, that they could not be distinguished by the naked eye. Both sorts appeared to be equally numerous, but the union extended only to two branches—all the rest bore female blossoms only. I may here incidentally remark, that the *great abundance* of the male flowers, in the present case, is a very singular phænomenon. I have read in botanical works, that a *few* male flowers are sometimes found in company with females, but never that they amount to an equal number, a circumstance that excited my admiration wi

respect to this individual; for I counted two hundred and seventy-five male buds."

But all his experiments on the *Dog's Mercury*, or *French Mercury*, turned out according to the prevailing opinion.

"The next and last plant producing male and female individuals, on which I made experiment, is the **MERCURIALIS ANNUA** (*French Mercury*). Five very small plants were removed from a garden, on the 22d of August, into five pots. They were managed in the same manner as the spinach during the winter, and were all so far advanced at the beginning of spring, that there was no difficulty in distinguishing the males from the females; of the latter there were three, and these alone were preserved. By the 24th of March blossoms with pistils appeared upon several branches, growing out of the axillæ of the leaves, and in a few days more the number was exceedingly increased. They were borne upon short flower-stalks, and, as usual, consisted of two small seeds or spherical anthers. They were of a green colour and hairy. The event was thus. The greater part of the blossoms dropped prematurely; of the few that remained the seeds grew for some time, but fell before they were ripe, and when sown, *they did not*

spring. As this took place before the male plants in the gardens and the fields about Pavia were in flower, I began to suppose mercury to be one of those numerous vegetables, which cannot propagate the species without the powder of the stamina. Meanwhile my three plants continued to put forth new branches, and the old ones, instead of withering, vegetated with great vigour; but still the seeds dropped prematurely. This gradual evolution and production of fresh branches, was of such long continuance, that they shewed no tendency to decay, but were producing blossoms with pistils when the mercury in the fields was in flower. I therefore began to entertain hopes, that the seeds now put forth, and those which should follow, would succeed better than the earlier seeds, more especially as the pots were exposed to the open air upon a window, and looked into a garden, in which grew several male individuals of this species. But my expectations were disappointed: as long as the three plants continued to thrive, the seeds dropped almost as soon as they appeared; nor did one of those that were sown, *ever come up.* I repeated the experiment *two succeeding years* with the same event.

“ It therefore became necessary to vary the

mode of conducting it. Being more confirmed in my suspicion, that the sterility arose from want of pollen, which, though it was at no great distance, did not reach my plants, I determined to bring it nearer; without, however, setting individuals of the different sexes in the same place. Two *male* plants of mercury, reared the next year in two pots, were placed on the outside of a window, and two *females* growing likewise in pots, were set on the outside of another window. Both windows belonged to one room, and had the same aspect. The four roots of mercury were nearly of the same age, and of the same size. And I waited with great anxiety to see whether the *females*, on account of their vicinity, would be impregnated by the *males*. The seeds were constantly falling, but not in such abundance as in the former experiment, when the *males* were at a much greater distance. Those which adhered went on thriving, and seemed as if they would ripen; and they did accordingly arrive at maturity, and, what is of more consequence, were very productive; and soon after I had sown them in a pot, I had the pleasure of seeing *them spring*. It therefore appeared certain, that the vicinity of the males to the females had been instrumental in occa-

sioning fecundation: their influence could scarce be derived from any source, besides the action of the contiguous pollen.

“ This experiment obviously required another: it was proper to bring the different individuals *nearer* to each other; I accordingly placed two *males* and two *females* upon the same window. It now became manifest, how much influence the *approximation* of the two sexes has upon fecundation. The two females retained *almost all* the seeds which were produced at this time, exceeding an hundred. The seeds grew perfectly ripe, and when put into the ground, were unfolded into as many plants.” Vide SPALANZANI, *on the Sexes of Plants*.

Order X. DECANDRIA.

Son.—Contains the *Papaw-tree* (CARICA), and *Myrtle-leaved Sumach* (CORIARIA).

Order XI. DODECANDRIA.

Also our STRATIOTES, (*Water Soldier*), and Datisca (*Bastard Hemp*).

Have any experiments been made with these plants?

Father.—Linnæus relates the following.
“ The *DATISCA CANNABINA* (*Smooth-stalked Bastard Hemp*) was raised from seed about ten years ago in my garden.

It abounded in flowers, but these being *females*, therefore proved abortive.

In order to obtain a *male plant* I procured some seeds from Paris.

These also grew well, but what vexed me was, they all proved *females*, and, therefore, produced me also flowers without fruit.

At length, in the year 1757, I procured other seeds.

Out of these some plants were *males*, and in the year 1758 flowered.

These I removed into a border very remote from the *females*.

Therefore, when the *male flowers* were mature for shedding their *farina*, I held a paper under them, and gently agitated the loose spike of flowers with my finger, until the whole surface was nearly covered with yellow *farina*.

I carried this to the *femate flowers*, which were produced in another part of the garden, and sprinkled it over them.

The result was, these *femate flowers* alone ripened their fruits where I had dispersed the *farina*, and their seeds attained their due mag-

nitide ; but in all the rest, being fertilized by no *farina*, there appeared not a vestige of any seeds." Vide LINNÆUS'S *Prize Dissertation on the Sexes of Plants*.

Son.—Our *Juniper* (JUNIPERUS), and *Yew-tree* (TAXUS), and *Butcher's Broom* (KURCUS), fall under this class.

Father.—Also the CLUTIA, a plant from the *Cape of Good Hope*.

Son.—Has any experiment been tried with this plant?

Father.—LINNÆUS, after giving us his experiment on the *Hemp*, says,

“ The CLUTIA PULCHELLA (*Broad-leaved Clutia*) was also, during the months of June and July, kept in the same window of my room.

“ The *male* and *female* plants were in different pots.

“ The *female* in consequence abounded in fruit, and indeed, not a single flower dropt abortive.

“ Then I separated the pots to different windows in the same room, nevertheless, all the *female* flowers produced perfect fruit.

“ I lately removed the *male* altogether, and only left the *female plant*, having first removed all the former, and newly expanded, flowers.

“ From the axilla of each leaf there daily appeared fresh ones, which remained for the space

of eight or twelve days, but afterwards the peduncles turning yellow, they fell off empty of fruit.

“ A friend, a botanist, who was delighted with this experiment with myself, one day persuaded me, that I should bring a *single male flower* from the stove in the garden, which he placed in contact with a *female* flower recently open, and tied this flower with a piece of red silk to know it again.

“ The next day I removed the male flowers, and this *one germen* indeed only remained, and produced fruit.

“ After the experiment, I took *another male flower* from the stove, and by means of a slender forceps, I removed from it one of its *anthers*, and having scratched it gently with the knib of a pen, I took care that a little of its *farina* might fall upon one of the *stigmas*, having guarded the remaining two *stigmata* by a cap made by an hollow roll of paper.

“ This *germen* also grew to a fruit of the ordinary size, and afterwards being transversely dissected, it *alone* produced a large seed in one of the three cells, the *other two* being empty.

“ The other flowers, not having suffered impregnation, every one of them, becoming withered, and dropt.

“The repetition of this experiment is also as readily to be repeated as the former.”

Practice in Class XXIII. POLYGAMIA.

Father.—This class contains the famous Banana Tree (*MUSA SAPIENTUM*), whose learned name, the *Tree of Knowledge*, excites curiosity.

Son.—I observe that beautiful plant the *MIMOSA* (*Sensitive Plant*) is of this class and order, I should wish to know more respecting the curious movement of this plant, as if it were alive.

Father.—This I will attempt to do. They possess a kind of muscular motion, by which the leaves and stalks are contracted and fall down, upon being slightly touched, or shaken with some degree of violence. The sensibility of these plants is lodged in the young branches, in the common foot-stalk of the winged leaves, and in the nerve or middle rib to which the lobes or lesser leaves are attached. These different motions, which seem to be totally independent of one another, may be aptly enough compared, by analogy, with the irritability of certain parts in animals.

The sensitive plant has two kinds of motion; the one natural, occasioned by the action of warm nourishing vapours; the other artificial, in consequence of being touched or shaken.

M. Duhamel having observed, about the fifteenth of September, in moderate weather, the natural motion of a branch of sensitive plant, remarked, that at nine in the morning, it formed with the stem an angle of one hundred degrees; at noon of one hundred and twelve degrees; at three in the afternoon, it returned to one hundred; and after touching the branch, the angle was reduced to ninety. Three quarters of an hour after, it had mounted to one hundred and twelve; and, at eight at night, it descended again, without being touched, to ninety.

The day after, in finer weather, the same branch, at eight in the morning, made an angle of one hundred and thirty-five degrees with the stem; after being touched, the angle was diminished to eighty; an hour after, it rose again to one hundred and thirty-five; being touched a second time, it descended again to eighty; an hour and an half after, it had risen to one hundred and forty-five; and upon being touched a third time, descended to one hundred and thirty-five, and remained in that position till five o'clock in the afternoon; when being touched a fourth time, it fell to one hundred and ten.

With whatever body the sensitive plant is touched or irritated, it is remarkable that the sensibility resides particularly in the articula-

tion or joining either of the branches of the common foot-stalk, or of the particular foot-stalk of each wing.

The time which a branch requires to recover itself after being touched, varies according to the vigour of the plant, the hour of the day, the season of the year, or the heat and other circumstances of the atmosphere.

The order in which the parts recover themselves, varies in like manner: sometimes it is the common foot-stalk; sometimes the ribs to which the lobes are attached; and sometimes the lobes themselves are expanded, before the other parts have made any attempt to be reinstated in their former position.

If, without shaking the other smaller leaves, we cut off half of a lobe belonging to the last pair, at the extremity or summit of a wing, the leaf cut and its antagonist, that is to say, the first pair, begin to approach each other; then the second; and so on successively, till all the lesser leaves of that wing have collapsed in like manner. Frequently, after twelve or fifteen seconds, the lobes of the other wings, which were not immediately affected by the stroke, shut; whilst the stalk and its wing, beginning at the bottom, and proceeding in order to the top, gradually recover themselves.

If, instead of one of the lesser extreme leaves, we cut off one belonging to the pair that is next the foot-stalk, its antagonist shuts, as do the other pairs successively, from the bottom to the top.

If all the lobes of one side of a wing be cut off, the opposite lobes are not affected, but remain expanded.

With some address it is possible even to cut off a branch without hurting the leaves or making them fall.

The common foot-stalk of the winged leaves being cut as far as three-fourths of its diameter, all the parts which hang down collapse, but quickly recover, without appearing to have suffered any considerable violence by the shock.

An incision being made into one of the principal branches, to the depth of one half the diameter, the branches situated betwixt the section and the root will fall down; those above the incision remain as before, and the lesser leaves continue open; but this direction is soon destroyed, by cutting off one of the lobes at the extremity, as was observed above.

Lastly, a whole wing being cut off with precaution near its insertion into the common foot-stalk, the other wings are not affected by it, and its own lobes do not shut. No motion,

occurs, which likewise is the case, when piercing the branch with a needle or other sharp instrument.

From the preceding experiments, most of which I have myself made, and from many others, which, for brevity's sake, I forbear to mention, these inferences are clearly to be deduced.

I. That when the plant is in its greatest vegetative force, its motions are greater and more sensible.

II. That when the sky is serene, and the sun bright during the whole day, the plant is more sensible in the morning than at noon.

III. That in the circumstances in which they are less sensible, the leaves continue to fold and collapse, although the foot-stalks, which through age become stiff and woody, have lost their motion.

IV. That a stroke, or an irritation, produces a more forcible effect than an incision or even an entire section.

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