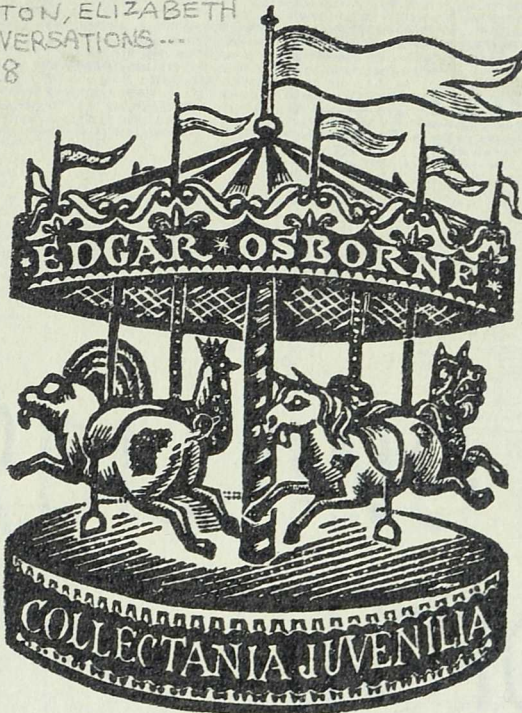


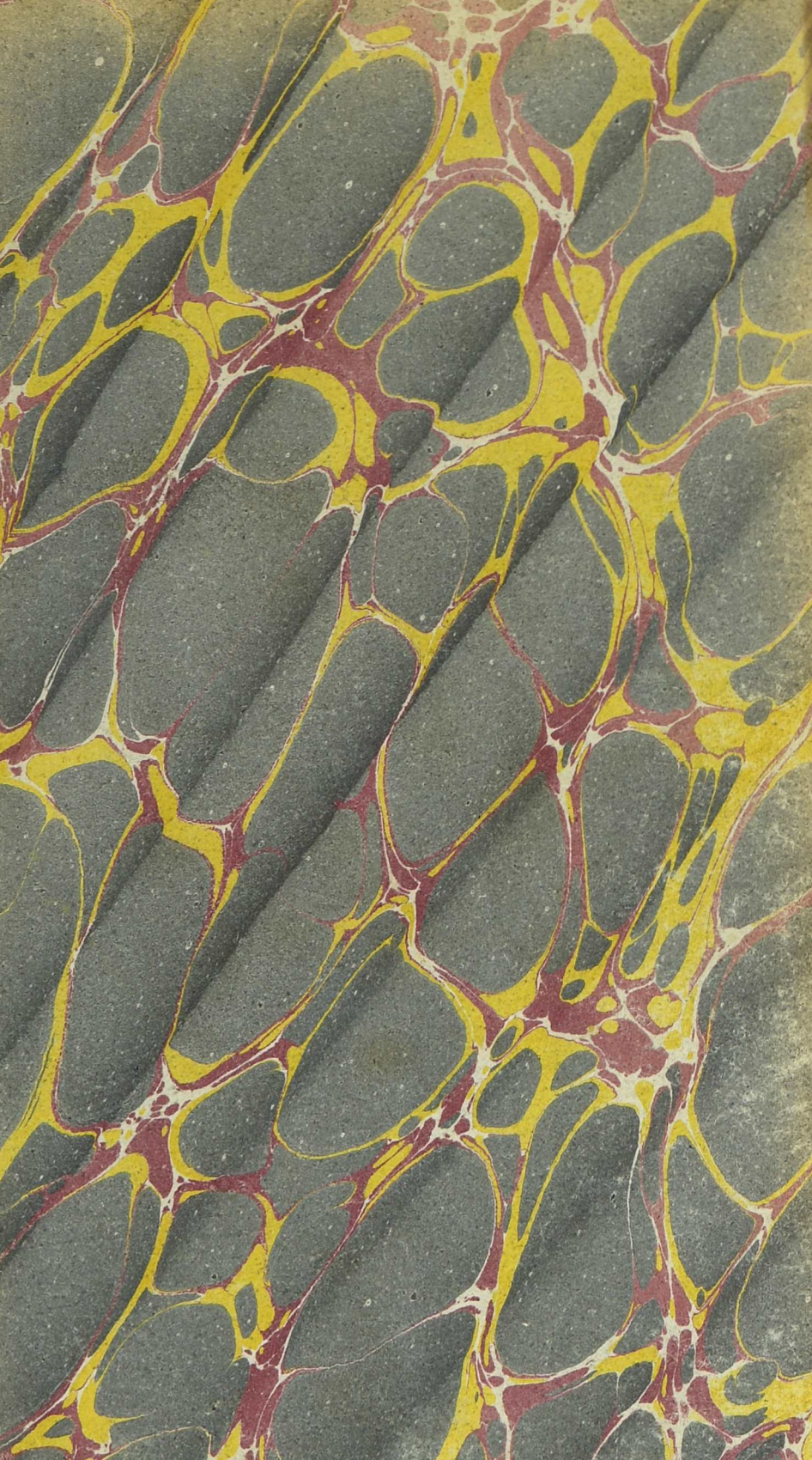
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FITTON, ELIZABETH
CONVERSATIONS ---
1828



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Egerton Grenville Bagnall Phillimore

From his Mother.

Sheptake.

May 1st. 1864

CONVERSATIONS

ON

BOTANY.

CONVERSATIONS

NO

B. O. T. A. N. Y.

LONDON:
Printed by A. & R. Spottiswoode,
New-Street-Square.



Papáver Rhóeas — *Common Red Poppy.*
Class XIII. *POLYANDRIA* — Order *MONOGYNIA*.

Sowerby, s.c.

CONVERSATIONS
ON
BOTANY.

WITH PLATES.

SIXTH EDITION.

LONDON:
PRINTED FOR
LONGMAN, REES, ORME, BROWN, AND GREEN,
PATERNOSTER-RROW.

1828.

...and Polyg...
...among the preceding classes, accord...
...to the number of their stamens; his...
...valuable "Arrangement of British Plants"

THE object of the following pages is to enable children and young persons to acquire a knowledge of the vegetable productions of their native country, by introducing to them, in a familiar manner, the principles of the Linnæan system of Botany.

For this purpose, the arrangement of Linnæus is briefly explained; a native plant of each class, with a few exceptions, is examined, and illustrated by an Engraving; and a short account is added, of some of the principal foreign species.

It is not without regret, that the classification of Linnæus has been in part relinquished, in order to conform to that adopted by Dr. Withering, who has distributed the plants of four of the Linnæan classes, Gy-

nandria, Monoecia, Dioecia, and Polygamia, among the preceding classes, according to the number of their stamens; his valuable “Arrangement of British Plants” being at present one of the best works of reference upon this subject, for persons unacquainted with Latin. Sir James Edward Smith’s English Flora furnishes to the English reader a systematical account of all our native plants, according to the original method of Linnæus.

What Miss Edgeworth has said of Chemistry, may with equal truth be applied to Botany, and may serve to recommend the study of it, as a branch of general education: — “It is not a science of parade, it affords occupation and infinite variety, it demands no bodily strength, it can be pursued in retirement; — there is no danger of its inflaming the imagination, because the mind is intent upon realities. The knowledge that is acquired is exact; and

the pleasure of the pursuit is a sufficient reward for the labour.” *

It may be due to the author of the admirable “ Conversations on Chemistry,” to mention, that the title of the present volume was chosen, because it was the only one, that seemed to be adapted to the nature of the subject, which had not been appropriated by preceding writers.

* “ Letters for Literary Ladies,” 3d edit. page 60.

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The two parts of Plate 2. are to face each other.

In this genus, which is the only native one of the class Polygamia, none of the flowers have stamens only.

Class 24. A small Specimen of a Fern, *Asple'nium trichoma'nes* — common Maiden-hair ; and of a Moss, *Hyp'num taxifo'lium* — yew-leaved Feather Moss, both of the natural size.

PRONUNCIATION
OF THE
LATIN NAMES OF PLANTS.

IT will be necessary for persons unacquainted with the Latin language, to observe the following rules, in pronouncing the botanical names of plants : —

1. The letter *e*, at the end of a word, is always to be sounded; for example, the word *Ga'le* is to be pronounced as if composed of two syllables, *Ga'-le*: and not like the English word *Gale*.

2. When the letters *c* and *h* come together, they are to be pronounced hard, like *k*. Thus, *Li'chen*, is pronounced *Li'ken*.

3. When the vowels *a* and *e*, *o* and *e*, or *e* and *i*, occur together, if not marked with two dots placed over them, as in *Daböe'cia*, pronounced *Da-bo-e-cia*, they are to be pronounced as one sound. Thus,

Cratae'gus, is to be pronounced *Cra-te'-gus*.

Monoe'cia - - - *Mo-ne'-cia*.

Cheiran'thus - - - *Ki-ran'-thus* —

with the *i* long, like the word *Eye*.

4. In words that end in *-ides*, the *i* is always to be pronounced long, like the word *Eye*; — *eye-des*; thus *Lichenöides*, is to be pronounced *Liken-o-Eye-des*.

The termination *-oides*, which is sometimes added to other words, is derived from the Greek word *eidōs*, which signifies form, resemblance, figure.

In this volume, wherever the accentuation of the Latin name or terms is not obvious, they are divided and marked, as they are to be pronounced; and the accent or force of the voice, is to be thrown upon the syllable which precedes the mark: — Thus,

Ar'butus, is to be pronounced *Ar'butus*, not *Arbu'tus*.

Veroni'ca - - - *Veroni'ca*, not *Veron'ica*.

PRONUNCIATION

LATIN NAMES OF PLANTS

It will be necessary for persons unacquainted with the Latin language, to observe the following rules, in pronouncing the botanical names of plants: —
1. The letter s, at the end of a word is always to be sounded; for example, the word *Orchis* is to be pronounced as if composed of two syllables, *Or-chis*; and not like the English word *Orch*.
2. When the letters c and k come together, they are to be pronounced hard like k. Thus, *Chama*, is pronounced *Chama*.

ERRATUM.

Page 53. line 14. for *Mistletoe* read *Miseltoe*.

CONVERSATIONS

ON

BOTANY.

CONVERSATION THE FIRST.

BOTANY IN GENERAL. — LINNÆUS. — USES OF BOTANY.

— PARTS OF A FLOWER.

EDWARD.

WHAT are you doing, mamma?

MOTHER.

I am examining the pretty little yellow flower, that we found this morning in the hedge.

EDWARD.

How do you examine a flower?

MOTHER.

You cannot understand the method, my dear, until you have learned something of Botany.

LINNÆUS.

EDWARD.

What is Botany?

MOTHER.

It is the science that makes us acquainted with plants, and teaches us how to distinguish them from one another. The term Botany is derived from a Greek word signifying an herb or grass. — Do you not recollect what your aunt and I were talking of yesterday in the garden? I thought you seemed attentive to our conversation.

EDWARD.

You said something about a very industrious man, who had examined a great many plants.

MOTHER.

Yes: — we were speaking of Linnæus, a celebrated botanist, who did so much to increase our knowledge of the works of nature, that he was called the Father of Natural History. He was born in Sweden, in the year 1707.

EDWARD.

Am I too young to learn botany? I think I should like it very much.

MOTHER.

By no means, my dear. It is so simple a study, that the youngest persons can understand it, when

the principles are properly explained to them; and if you like, I will teach you all I know of it. Linnæus himself was scarcely four years old, when he heard his father describing to a friend some flowers, which he had just gathered from the turf where they sat. This first botanical lecture made such an impression upon him, that, afterwards, he used to ask his father the names and properties of all the plants he could procure: and even at that early age, he began to attend to the habits and distinctions of animals and insects also.

EDWARD.

What is the use of botany?

MOTHER.

You are not yet old enough to understand all its uses, but I will endeavour to tell you some of them. You will be surprised to learn the variety of purposes to which plants are applied: they form the principal part of our food, medicine, clothing, and furniture, and several of the most beautiful dyes are obtained from them; but in some instances the different kinds resemble each other so nearly, that ignorant persons have often mistaken those which are hurtful, or of no value, for the useful ones. Some animals are guided by an instinct that teaches them what to choose and what to avoid: but men must have recourse for this pur-

pose to their own experience, or the observations of others; and without a knowledge of botany, we could neither understand the descriptions given by other persons, nor describe them ourselves so as to be understood. As an amusement, botany has many recommendations: it may be studied with less expense than most other sciences; it invites us into the country, and increases the pleasure of every walk: and the cultivation of plants in the garden affords one of the most innocent and healthful occupations that we can enjoy. — Indeed the study of natural history in general is so attractive, that those who once engage in it seldom give it up. The sameness of most other pursuits becomes at last fatiguing; but the naturalist meets with endless variety; and at every step he discovers in the works of nature, beautiful contrivances which escape the attention of common observers.

EDWARD.

But when do you think I shall be able to examine a plant as you do now? Is it very difficult?

MOTHER.

At first it may appear so to you; but do not be frightened at the undertaking: you will soon find that it is not a great one. Nothing is required but to have patience; — to begin at the beginning:

after that you need not go any farther than you choose. An indolent person, it is true, can never expect to become a good botanist, nor, indeed, to be good for any thing. When Linnæus was about to publish one of his most celebrated works, * he examined the characters of eight thousand flowers : so that you may judge how very industrious he must have been. If you are attentive, and try to remember what I shall tell you, I think that at the end of a month you may be able to examine the flowers you meet with in your walks, without my assistance.

EDWARD.

I long to begin ! — Will you take a walk with me to-morrow in the fields, to bring home some flowers ?

MOTHER.

With pleasure, my dear ; I am very glad to see you so eager to begin this delightful study : but before we set out, you had better learn the names of the different parts of a plant. You already know, that the **ROOT** is that part which grows in the ground, and supplies the rest with nourishment. The **STEM** rises from the root, and is generally clothed with green leaves. The **FLOWER** is the beautifully coloured part that you so often admire ; it is divided into several different parts, which I will explain to you, if you will go into the garden and bring me a branch of any plant you like.

* Genera Plantarum, Genera of Plants.

EDWARD.

Here, mamma, is some Wall-flower: it is the first that I could find in blow.

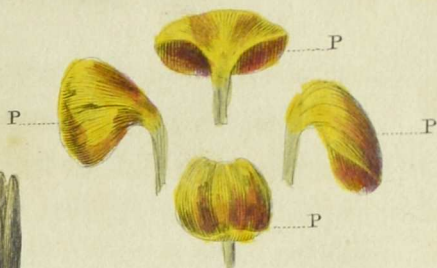
MOTHER.

It will do very well; but if we had a larger flower you could see the different parts more distinctly. [See PLATE 1.] You may now break off one of the flowers, and hold it by the little stalk, between your thumb and finger. The green part, that you see close under the yellow blossom, and which is not unlike a cup, is called the CA'LYX or flower-cup. The yellow leaves that grow out of it are called PET'ALS or blossom-leaves: the petals altogether form what is called the COROL'LA or blossom. Pull off, very gently, from the little stalk, the calyx and petals, and you will see seven threads; one in the middle thicker than the rest, and the other six with yellow heads; those with heads are called STAMENS, and are each composed of two parts,—the heads called ANTHERS, and the threads which support them FIL'AMENTS; as this pen-knife is divided into two parts, the handle and the blade, which are together called a knife. The centre thread is called the PISTIL, and consists of three parts; the GERMEN or seed-bud, which is the thickest green part at the bottom,—the STYLE which stands upon it,—and the SUMMIT, or top of the style. When the petals fall off, after the plant has been in flower

PARTS OF A FLOWER.



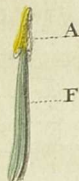
Flower



Corolla or Blossom



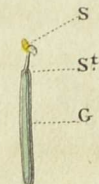
Calyx or Cup



Stamen

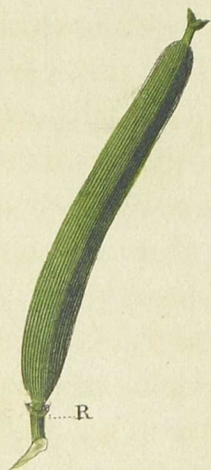


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Pistil

Stamens, Pistil, Nectaries and Receptacle, magnified.



Seed Vessel



Seed Vessel opened

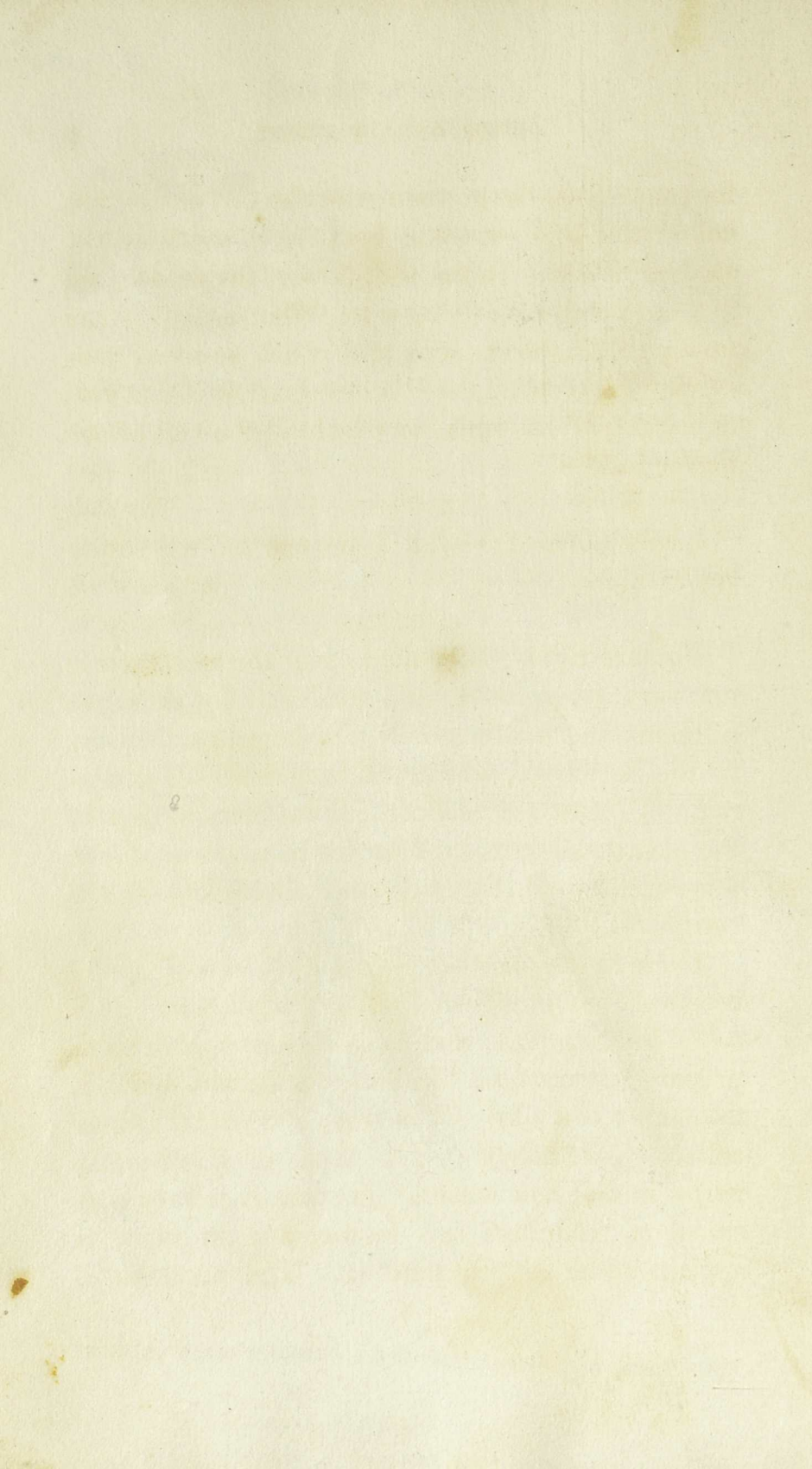


Receptacle

The Flower here shown is that of the COMMON WALL FLOWER.

P. Petal - A. Anther - F. Filament - N. Nectary.
S. Summit - S^t. Style - G. Germen - R. Receptacle.

Sowerby sc.



for some time, the germen grows larger, and is then called the SEED-VESSEL, because it contains the seeds within it. In the wall-flower, the seed-vessel is a long pod, containing several flat seeds. If you now pull off the stamens and pistil, you may perceive what is called the RECEPTACLE: it is that part at the top of the stalk, to which all the rest of the flower is fixed.

EDWARD.

I have done so; — but I do not see any thing remarkable.

MOTHER.

You are right. In many flowers the receptacle is not very conspicuous, and the Wall-flower is one of them; but in others it is very large, particularly in the Artichoke, which you sometimes see at dinner. What we commonly call the bottom, that is, the part which remains after we have taken off the leaves, and the bristly substance, or choke, — is the receptacle.

There is also another part, which, as well as the receptacle, is indistinct in the Wall-flower. It is called the NECTARY, and its use is supposed to be to prepare a sweet fluid like honey or nectar, which it frequently contains. It is from this part that bees collect their honey. The form of the nectary varies in different flowers; in some it is very conspicuous, in others less visible, and in many it appears to be entirely wanting. The nectaries of

the wall-flower are two little greenish bodies surrounding the lower part of the short stamens; but as you cannot easily see them, I shall take an opportunity, when we examine a plant that has larger nectaries, of pointing them out to you. There are many flowers whose parts are so small, that they cannot be seen distinctly without the help of a magnifying-glass; here is one that you shall have to assist you:—and you will find a needle and a sharp-pointed pen-knife also very useful; for some flowers are too delicate to be divided by the fingers alone.

CONVERSATION THE SECOND.

LINNÆAN ARRANGEMENT OF PLANTS. — CLASSES. —
 ALTERATIONS ADOPTED BY DR. WITHERING. —
 ORDERS. — GENERA. — SPECIES.

EDWARD.

WHEN I have examined a plant, mamma, how am I to find out its name?

MOTHER.

Before you can do so, you must learn how the vegetables that are known have been arranged; and I will now explain to you, as clearly as I can, the system of Linnæus, which is the one almost universally used in this country.

Linnæus distributed all plants in twenty-four divisions, each of which is called a CLASS; and each class he subdivided into ORDERS. The first eleven classes are distinguished by the number of separate stamens in each flower. — But tell me, whether you recollect what the stamens and pistils are?

EDWARD.

I think you said, that the whitish threads called

filaments, and the yellow heads, or anthers, were both together the stamens; and the thicker thread, that stands in the middle of them, the pistil.

MOTHER.

You are quite right. I am very glad to find that you remember so well what I tell you.

In the first class, *MONAN'DRIA*, each flower contains ONE STAMEN.

In the second, *DIAN'DRIA*, TWO STAMENS; and so on, to the tenth class, *DECAN'DRIA*, which has TEN STAMENS in each flower.

In the eleventh class, *DODECAN'DRIA*, each flower contains from ELEVEN TO NINETEEN STAMENS.

In the twelfth, *ICOSAN'DRIA*, there are TWENTY STAMENS OR MORE in each flower, the precise number not being of any consequence;— and they are FIXED TO THE CALYX.

The thirteenth class, *POLYAN'DRIA*, at first sight is like the twelfth; but the difference, which is very important, is, that THE STAMENS ARE FASTENED TO THE RECEPTACLE, instead of growing from the sides of the calyx. If you do not perceive this difference at once, in examining plants of these two classes, the surest way is to pull off the calyx gently, and then, if the stamens remain, you may conclude that they grow upon the receptacle, and that the plant is in the class *Polyandria*.

The character of the fourteenth class, *DIDY-*

NA'MIA, is, that the flowers have each four stamens, TWO OF THEM LONG AND TWO SHORT.

In the flowers of the fifteenth class, TETRADYNA'MIA, there are six stamens, FOUR LONG AND TWO SHORT.

In the sixteenth, MONADEL'PHIA, the FILAMENTS ARE ALL UNITED TOGETHER, forming a little tube round the pistil.

In the flowers of the seventeenth class, DIADEL'PHIA, the FILAMENTS ARE UNITED at the bottom, generally IN TWO SETS.

The eighteenth class, POLYADEL'PHIA, contains those plants which have their FILAMENTS UNITED at the bottom INTO THREE OR MORE LITTLE PARCELS or bundles; as you may see in the large Saint John'swort in the garden.

The ANTHERS, in the nineteenth class, SYNGENE'SIA, ARE UNITED, and form a little tube; but the filaments are separate.

In the twentieth class, GYNAN'DRIA, the STAMENS GROW OUT OF THE PISTIL itself.

The twenty-first class, MONOE'CIA, contains those plants, in which the stamens and pistils grow in SEPARATE FLOWERS, but on the SAME PLANT.

The twenty second, DIOE'CIA, those in which the stamens and pistils grow in SEPARATE FLOWERS, and on DIFFERENT PLANTS.

In the twenty-third class, POLYGA'MIA, THREE DIFFERENT SORTS OF FLOWERS GROW ON THE SAME

PLANT; some of them having pistils only, some stamens only, and others both stamens and pistils.

But Dr. Withering, in his “Arrangement of British Plants,” which is one of the best books that you can refer to, until you have learned Latin, has distributed the plants of these last four classes among the first nineteen, according to the number of their stamens.

Those that belong to the twenty-fourth class, CRYPTOGA'MIA, have FLOWERS which are NOT VISIBLE TO THE NAKED EYE; such as ferns, mosses, sea-weeds, mushrooms, &c.

EDWARD.

I am afraid I shall never remember the distinctions of all these classes.

MOTHER.

Do not be alarmed, my dear; here is a drawing I have made [PLATE 2.], that will assist your memory, and show you their different characters; and I have written the Latin names over the figures, that you may learn them, as well as the numbers, — because they are used by all botanists in speaking of the classes.

EDWARD.

Then how can I learn botany, without knowing Latin?

C.1. MONANDRIA.



One Stamen in each Flower.

C.2. DIANDRIA.



Two Stamens.

C.3. TRIANDRIA.



Three Stamens.

C.4. TETRANDRIA.



Four Stamens.

C.5. PENTANDRIA.



Five Stamens.

C.6. HEXANDRIA.



Six Stamens.

C.7. HEPTANDRIA.



Seven Stamens.

C.8. OCTANDRIA.



Eight Stamens.

C.9. ENNEANDRIA.



Nine Stamens.

C.10. DECANDRIA.



Ten Stamens.

C.11. DODECANDRIA.



Eleven to Nineteen Stamens.

C.12. ICOSANDRIA.



More than Twelve Stamens fixed to the Calyx.

C. 13. POLYANDRIA.



More than twenty Stamens fixed to the Receptacle.

C. 14. DIDYNAMIA.



Four Stamens two long and two short.

C. 15. TETRADYNAMIA.



Six Stamens four long and two short

C. 16. MONADELPHIA.



All the Filaments united.

C. 17. DIADELPHIA.



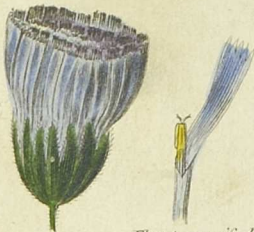
The Filaments united in two sets.

C. 18. POLYADELPHIA.



The Filaments united in more than two sets.

C. 19. SYNGENESIA.



Floret magnified

Five Stamens-The Anthers united.

C. 20. GYNANDRIA.



The Stamens growing upon the Style.

C. 21. MONOEGIA.



Pistile magnified

Stamens magnified

The Stamens and Pistils in separate Flowers on the same Plant.

C. 22. DIOECIA.



Floret magnified

Floret magnified

The Stamens and Pistils in separate Flowers on different Plants.

C. 23. POLYGAMIA.



Pistil

Flowers magnified

Stamens only - Pistils only, or both in each Flower.

C. 24. CRYPTOGAMIA.



The Stamens and Pistils not visible to the naked Eye.

MOTHER.

There are several English books in which the Latin words employed in botany are very clearly explained *; and until you are able to make use of them without my assistance, I will explain every thing as we go on.

EDWARD.

Will you now tell me something about the Orders, mamma?

MOTHER.

In the first thirteen classes, from Monandria to Polyandria, the Orders are known by the number of Pistils in each flower.

When there is only one pistil, the plant is said to be in the order MONOGYN'IA.

If there are two, DIGYN'IA.

If three, TRIGYN'IA.

If four, TETRAGYN'IA.

If five, PENTAGYN'IA.

If six, which is not common, HEXAGYN'IA.

If seven, HEPTAGYN'IA; still less common.

If eight, which scarcely ever occurs, OCTAGYN'IA.

If nine, of which there is hardly an instance, ENNEAGYN'IA.

If ten, DECAGYN'IA.

* Martyn's Language of Botany, &c.

If about twelve, DODECAGYN'IA.

Many pistils, — that is, more than twelve, —
POLYGYN'IA.

In the fourteenth class, Didynamia, the orders, which are two, depend upon the seeds being contained in seed-vessels or not. They are called —

GYMNOSPER'MIA, when the SEEDS are NAKED, or to be seen without a covering: and

ANGIOSPER'MIA, when the SEEDS are INCLOSED in a seed-vessel.

The orders of the fifteenth class, Tetradynamia, are also two, and are determined by the shape of the seed-vessels, which are called Pods.

The first has broad SHORT PODS, and is called SILICULO'SA.

The second has LONG PODS, and is named SILIQUO'SA.

In the sixteenth, seventeenth, and eighteenth classes, Monadelphia, Diadelphia, and Polyadelphia, the orders are known by the number of Stamens.

The nineteenth class, Syngenesia, contains five orders; but as they are rather difficult to understand, it will be time enough to learn them when you come to examine plants of that class, which I should not advise you to do for some time. Nor is it necessary for you to learn at present the orders of the five remaining classes, which are also difficult.

EDWARD.

I should like to try to find out, by myself, what class and order some plant belongs to.

MOTHER.

That is the best thing you can do now, and here is a Tulip to begin with. It is always a good way, when you find a plant that is new to you, to examine some of the flowers which are not yet quite opened, as well as those that are; for the anthers are then more distinct, and you may be sure that none of them have been lost.

EDWARD.

I think this Tulip is in the sixth class, Hexandria, and the order Monogynia.

MOTHER.

It is, my dear; but why do you think so?

EDWARD.

Because it has six stamens and one pistil. But the anthers are black, instead of being yellow like those of the Wall-flower that we examined yesterday. — Does that make any difference?

MOTHER.

No. The powder with which the anthers are covered, and which is called POLLEN, or FARI'NA, is of different colours in different plants.

EDWARD.

I wish the Tulip had a sweet smell, it looks so beautiful.

MOTHER.

We must not expect to find in plants, any more than in other things, many perfections united: — Those that look best are seldom the most useful. — Do you remember the lines our friend wrote for you the other day?

EDWARD.

I believe I do —

For brilliant tints, to strike the eye,
 What plant can with the Tulip vie?
 Yet no delicious scent it yields,
 To cheer the garden or the fields,
 In vain in gaudy colours drest,
 'Tis rather gazed at than caress'd.

MOTHER.

I must now finish what I was going to say, before we take our walk.

Linnæus further divided the Classes and Orders into what are called GENERA, and these genera again into SPECIES.

A GENUS, which is the singular of the word Genera, is formed of a number of plants, that agree with each other in the structure of their flowers and fruit.

A SPECIES includes such plants as agree in these particulars, but differ in others; as in the leaves,

the stem, the root, or other parts besides the flower. For instance, you often see in green-houses a great many different sorts of Geranium: these Geraniums form a genus or family of plants, and each different sort is a species of that genus;—so that when you hear a person say, an Ivy-leaved geranium, a Rose-scented geranium, or a Butterfly geranium, you know that they all belong to the genus Geranium, and that the Ivy-leaved, &c, are the different species.

In distinguishing plants, two words are always employed by botanists; the first, which is applied to all the species of the same genus, is called the **GENERIC NAME**; but the second is confined to a single species only, and is called the **SPECIFIC, or TRIVIAL, NAME**. This mode of naming plants is so much approved of, that it is universally used, even by those botanists who arrange them in a different manner from Linnæus. The two names thus employed are understood in every part of the world, by those who study botany; but the common names are different in different countries. If you were to talk of Wall-flower, or Stock-Gilliflower, to a French or German botanist, he would not understand you, — nor would you know what he meant by the French or German names of those plants, though very common in his own country; but the names *Cheiran'thus fruticulo'sus*, and *Cheiran'thus sinua'tus*, would immediately signify to him that

you were speaking of two different species of the genus *Cheiranthus*; and if he did not know them, he could find their descriptions by referring to botanical books.

EDWARD.

Shall we examine a geranium first, as we have so many in our green-house?

MOTHER.

No, my dear, — for the genus is in the sixteenth class, *Monadelpia*; and, I think, it will be easier for you to begin with a plant in one of the first ten classes, which depend on the number only of the stamens. Besides, the *Geraniums* in the green-house are not natives of England, that is, they do not grow wild in the hedges and fields; and we had better confine ourselves, for some time, to the examination of native plants only. Although these are generally called weeds, many of them are so beautiful that they are cultivated in flower-gardens. An acquaintance with the plants of our own country is more desirable for you than a knowledge of foreign ones, as they are more within your reach; and it will be impossible to be thoroughly acquainted with both, unless you devote much more time to Botany, than you can give it without neglecting your other employments.

CONVERSATION THE THIRD.

CLASS 1. MONAN'DRIA. — MARE'S-TAIL. — GLASSWORT.
 — INDIAN ARROW-ROOT. — TURMERIC. — INDIAN
 SHOT. — CLASS 2. DIAN'DRIA. — VERONI'CA CHA-
 MÆD'RYS, GERMANDER SPEEDWELL, EXAMINED. —
 PRIVET. — PEPPER. — ASH-TREE. — OLIVE. — ROSE-
 MARY. — SAGE.

EDWARD.

MAMMA, shall we find plants of all the first ten classes in our walks?

MOTHER.

I do not think we shall, for there are very few native plants in the classes Monandria, Heptandria, and Enneandria, (the first, seventh, and ninth,) and they are not common. But all that I wish you to do at present is, to gain such a knowledge of the different parts of plants, with their classes and orders, as will enable you to understand and make use of the books which are generally employed by persons who study botany. Even if we did find a plant in the class Monandria, I should not advise you to examine it, as the flowers are very small, and not easily distinguished by a young beginner.

The Mare's-tail, to which Linnæus has given the

generic name of Hippu'ris, and the specific name vulga'ris, is in the first class; it grows in muddy ponds, though not very commonly found. The flowers are very small, and grow close to the stem at the bottom of the leaf; and their structure is very simple; for they have no blossom, and only one stamen, one pistil, and one seed. [See PLATE 2. Class 1.]

EDWARD.

But how can it be called a flower without having a blossom?

MOTHER.

All the parts that are necessary to form a perfect flower are the stamens and pistils, for these alone are concerned in the production of the seed. You will find, hereafter, that some flowers have not any calyx, and others no petals, (which, you recollect, form the blossom); but you will never find any without stamens or pistils.

If we were near the sea, I could, perhaps, show you a useful plant, the Jointed-Glasswort, or Marsh-Samphire, *Salicornia herba'cea*, which is also in the class Monandria. It has a saltish taste, and cattle are very fond of it. In some countries this plant, with several others that grow near the coast, is cut down towards the end of summer, when fully grown; and being dried in the sun, they are burnt for the sake of their ashes, which are used in making glass and soap, and are called Kelp.

The Indian Arrow-root, too, that your little brother has sometimes for breakfast, is obtained from a plant of this class, *Maran'ta arundina'cea*; which is a native of South America, and has its English name from being supposed to extract the poison from wounds given by the poisoned arrows of the Indians. It has a thick fleshy root, which, when washed, pounded, and bleached, makes the powder that we use as food.

The Turmeric, so commonly used in dyeing yellow, is the root of a plant, also in the first class, called *Cur'cuma lon'ga* by Linnæus. It is very much cultivated in the East Indies and in China, for the sake of its roots, which are sold in our shops as a dye. Indian Shot, *Can'na In'dica*, a native of both the Indies; and Ginger, *Zin'giber officina'le*, a native of the East Indies, belong also to this class.—But I dare say you are now anxious to examine a plant yourself, so let us go into the fields and look for one.

EDWARD.

Oh, here is a nice little blue flower; shall I take it home, it is so pretty?

MOTHER.

Do, my dear; and if you can tell me the class and order it belongs to, I will show you how to find out its name, in Withering's Botany.

EDWARD.

I see only two stamens, and one pistil; so that, I suppose, it is in the second class, and the first order. Am I right?

MOTHER.

Yes, perfectly right; but you must remember, if you can, to call each class and order by the names Linnæus gave them.

EDWARD.

Then this plant is in the class Diandria, and the order Monogynia. What am I to do next?

MOTHER.

You must now hold the flower in your hand, and look at every part very attentively, while I read to you the descriptions of a few genera in the class Diandria. The first genus described has a very small cup; of one leaf,—that is, consisting of one piece; with four blunt teeth, or divisions, in its rim. Look at your calyx, and see if it is like this.—[See PLATE 3.]

EDWARD.

It is of one piece, but the divisions are sharp.

MOTHER.

Very well. Now look again at your flower. “The blossom of one petal—”

EDWARD.

It cannot be that; for mine has four petals.

MOTHER.

Pull them out, and let me see. I think you will find, that when you attempt to take one, they will all come off together.

EDWARD.

So they do;—and the stamens with them!

MOTHER.

Then you see that your blossom has but one petal, with four divisions, though at first you thought it had four petals. Blossoms formed of one piece, are called *MONOPET'ALOUS*; those of many pieces, *POLYPET'ALOUS*. In flowers of one petal, the stamens are generally fastened to the blossom, and in those of more petals, to the receptacle or calyx; so that in the latter case we may take away the petals without the stamens. This observation affords an easy and pretty certain rule for knowing whether a corolla consists of one petal, or of several, when it is difficult, as it sometimes is, to know this immediately. When the calyx is formed of one piece, as is the case in this plant, it is said to be *Monophyllous*, when of more than a single piece, *Diphyllous*, or two-leaved; *Triphyllous*, three-leaved, &c.; or *Polyphyllous*, many-leaved; according to the number of distinct pieces of which it consists.—We must now go on with our description where we left off.

“ The blossom of one petal, shaped somewhat like a funnel; tube of the blossom longer than the cup;” — the TUBE is the lower part of a blossom of one petal, which stands in the calyx — “ Border of the blossom,” that is, the upper spreading part, “ divided into four egg-shaped segments or divisions. “ Filaments opposite to each other. Anthers nearly as long as the blossom. The germen, or lowest part of the pistil, nearly round; style very short; summit thick, blunt, cloven,” that is, divided, half-way down. — Does this agree with your plant ?

EDWARD.

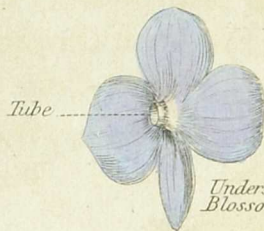
I think it is something like it, except in the pistil. The summit of mine is not divided, and the style is not very short.

MOTHER.

Well, we must see if the next genus will answer better. — “ Calyx, one leaf, with two divisions. Blossom, two petals.” — We need not go any farther with this genus, for your flower has but one petal; let us try another. — “ Calyx, a cup; with four divisions, each of them sharp. Blossom of one petal; tube of the blossom, nearly as long as the cup; border flat, divided into four egg-shaped parts, the lowest division narrower than any of the others. Stamens two; filaments thinner at the bottom than in the other parts; anthers oblong. Germen



Blossom magnified



Underside of the Blossom magnified



Pistil magnified

Veronica Chamoedrrys — *Germander Speedwell*.

Class II. *DIANDRIA* — Order *MONOGYNA*.

compressed or flattened; style, thread-shaped, as long as the stamens; summit undivided." —

EDWARD.

That is exactly like mine, in every thing.

MOTHER.

It is your plant, my dear; so that we need not read any more at present. The genus is called Veroni'ca, and is distinguished from all other genera of the same class and order, by having the lowest division of the blossom narrower than the rest. We ought now to determine what species of Veroni'ca your plant belongs to, by comparing it with the different descriptions given by Withering; but as there are a great many species, and some of them very like each other, I will tell you which it is at once, that you may not be too much puzzled. It is Veroni'ca Chamæd'rys, called in English Germander Speedwell; [see PLATE 3.] and it is known from the other species by the bunches of flowers rising from the sides of the main stem. The leaves are egg-shaped, wrinkled, toothed at the edges, and sitting, that is, growing close to the stem without any little stalks of their own; and the stem, through its whole length, has two hairy lines, one on each side, but placed alternately between the joints.

EDWARD.

The young leaves that are not yet opened, look as if they were covered with down.

MOTHER.

The leaves of several plants, especially when young, are clothed with very fine hairs; which Grew, an English botanist, who lived in the time of Charles the Second, considered as intended for their protection; the leaves being exceedingly tender in their infant state: — “So that they seem,” he says, “to be vested with a coat of frise, or to be kept warm like young and dainty chickens in wool.” *

EDWARD.

I never thought it could be so easy to find out the name of a plant. How plain the description is! — But what was the first plant that you read about, which had the summit divided?

MOTHER.

It was common Privet, *Ligustrum vulgare*, of which hedges are often made, as it grows very fast. The purple colour upon cards is prepared from its berries; which are filled with a spongy violet-coloured pulp, and make also a good green dye, with the addition of alum.

* Grew's Anatomy of Plants, p. 54.

EDWARD.

Are there many useful plants in the class Diandria?

MOTHER.

Not so many as in several of the other classes, but I will mention a few of them.

The black Pepper plant, *Piper nigrum*, is a native of the East and West Indies, and some of the South Sea Islands. It is cultivated with such success in the Molucca Islands, Java, and Sumatra, that it is exported from them to every part of the world where regular trade is carried on. White pepper was formerly thought to be a different species from the black; but it is nothing more than the ripe berries deprived of their skin by steeping them in water, after which they are dried in the sun. It is this berry, ground into powder, that you see used every day at dinner.

The common Ash, *Fraxinus excelsior**, is a native of England; and is placed by Withering in the class Diandria, because the flowers contain two stamens. In the north of Lancashire, when grass is scarce, the tops of the ash trees are cut down to feed the cattle. The wood is hard and tough, and is much used for making tools employed in husbandry.

* In the twenty-third class, Polygamia of Linnæus.

The Olive tree belongs to the genus *Olea*, in this class, of which there are several species. It is supposed to have come originally from Asia, where it gave the name to the Mount of Olives near Jerusalem. The *Olea Europæa* is a small evergreen tree, universally cultivated in the south of Europe for the sake of its fruit, from which olive-oil is obtained by pressing it in a mill. The unripe olives, when pickled, are sent over in barrels to England, where they are eaten at desserts. Another species, called the sweet-scented Olive, *Olea fragrans*, is kept in green-houses in this country, and is valuable for the delightful scent of its little white flowers, which resembles that of the highest perfumed green tea.

The common Lilac, *Syringa vulgaris*, a native of Persia, the white Jessamine, *Jasminum officinale*, of the south of Europe, Rosemary, *Rosmarinus officinalis*, and Sage, *Salvia*, are also in the class *Diandria*; and you will find in them very distinctly the characters of their class and orders. Rosemary, which you have seen in the garden, is an evergreen shrub, and grows wild on the shores of the Mediterranean sea. It was so abundant in Languedoc about the sixteenth century, that the inhabitants burnt scarcely any other fuel.

There are more than sixty different species of Sage, several of which are natives of Europe; but two only have been found wild in England, — Mea-

dow-Sage, *Salvia pratensis*, and wild English Clary, *Salvia verbenica*. An infusion of sage leaves is sometimes used as tea; and the Chinese say they are surprised that Europeans should come to them for tea, when we have sage, which they think far superior. The Dutch have long been in the habit of collecting, not only in Holland, but in the south of France, large quantities of sage leaves, which they dry like tea, and pack in cases for exportation to China, where, for every pound of sage, they receive in exchange four pounds of tea.

The sweet-scented Vernal-grass, *Anthoxanthum odoratum*, that smells so delightfully in new-made hay, is the only native grass in this class. But I am afraid that if I tell you any more at present you will be tired; so we shall leave the third class, *Triandria*, until to-morrow.

CONVERSATION THE FOURTH.

CLASS 3. TRIAN'DRIA. — CRO'CUS VER'NUS, SPRING CROCUS, EXAMINED. — THE GRASSES. — WHEAT, BARLEY, OATS, &C. — SUGAR CANE. — SUGAR-MAKING. — REED. — BAMBOO. — DAC'TYLIS GLOMERA'TA, ROUGH COCK'S-FOOT GRASS, EXAMINED. — BUTCHERS'-BROOM. — SEDGE.

EDWARD.

MAMMA, will you come out with me now to look for a plant in the third class?

MOTHER.

Yes; but we need not go farther than the garden, for you cannot have a better example than the Crocus, which is a native of England, though it does not grow wild in our neighbourhood.

EDWARD.

Here are purple, yellow, and white Crocuses, are they of different species?

MOTHER.

Perhaps not; for the character of the species does not depend upon the colour, size, or smell of



Stamen

Pistil

Crocus vernus - *Spring Crocus*.

Class III. *TRIANDRIA* Order *MONOGYNIA*.

the flower. Plants which differ in these respects only, are called *Varieties*: and if you compare these three different coloured Crocuses, you will probably find that they agree in the leaves and other parts, which, I told you, were to be attended to, in distinguishing species. In general, every part of a plant has a peculiar shade of colour. The root is commonly black, white, or brown; seldom yellow or red, but never green. The stem and leaves are commonly green; and rarely blue, yellow, or red. The calyx is generally green, but with some exceptions; that of the *Daph'ne Laure'ola*, Spurge Laurel, is yellow, and the blossom green; the calyx of the *Fuch'sia coccin'ea*, scarlet Fuchsia, is of a bright scarlet, and the petals in the centre of the richest purple. Corollas have almost every different variety of colour; but rarely green, and scarcely ever black. The black spot in the blossom of the common garden-bean, is the darkest colour I have ever seen in any plant. — Now bring in a Crocus, and I will read you a description of it. [See PLATE 4.] You perceive that it has three stamens, and one pistil: what class and order then does it belong to?

EDWARD.

To the class Triandria, and order Monogynia.

MOTHER.

Very well. Now look at it as you did at the

Veroni'ca: this sort of calyx, which is very different from those I have already described to you, is called a *Sheath*, and is composed of one leaf rising from the stem; and you see it is not green, like the cups of most other flowers, but whitish tinged with brown, and formed of a thin skinny substance. "The blossom is of one petal. Tube of the blossom very long: border with six divisions, standing upright, not open and spreading like that of Veroni'ca. Segments egg-shaped, pointed, and all of the same size. Stamens three; filaments the shape of an awl, shorter than the blossom; anthers shaped like the head of an arrow. The germen of the pistil, which is placed below the blossom and concealed in the sheath, is roundish; the style thread-shaped; and the summits, which are three in number, are notched like the teeth of a saw, and a little twisted."

This is the generic character of Cro'cus; and our species is the ver'nus, or Spring Crocus, which is distinguished by the summits being of a pale colour, not very long, and standing up straight within the flowers.

There are two other native species, sati'vus and nudiflo'rus: but the last is very rare. In the sati'vus, or Saffron, the tube of the blossom is very long, and the summit of the pistil is divided into three long strap-shaped segments, which are of a full orange colour, and hang out of the blossom. The petals are of a violet colour, and the plant has an agree-

able smell. The leaves, also, of the Saffron, are not so broad as those of the Spring Crocus.

The summits of the pistil of the *Crocus sativus* are, I believe, the only parts of any of the species that are made use of. They are carefully picked, pressed together, and dried in kilns, and are then the Saffron that is sold in the shops, which was formerly very much used in medicine. There is a place in Essex called Saffron-Walden, from the quantity of this plant which was formerly cultivated there, for the purpose of preparing the drug.

EDWARD.

Can we find any other plants of this class in the fields?

MOTHER.

You cannot go into any field without meeting some of them; for the class Triandria contains almost all the grasses, which are, you know, so common and so useful; the leaves affording pasture for cattle, the small seeds food for birds, and the larger for men.

Linnæus remarks, that grasses are the most numerous and generally diffused of plants; constituting a sixth part of all the vegetables on our globe, especially in open situations. Most of them are scentless, but a few are fragrant, especially when dry; and none are known to be poisonous,

except the Darnel, *Lolium temulen'tum*, which has poisonous seeds.

EDWARD.

I have never seen the flowers of grasses. Are they pretty?

MOTHER.

I am not surprised that you have never observed them; for, not having petals of brilliant colours like many other flowers, they are generally overlooked; but they are not less curiously constructed than those which are more beautiful in appearance.

The care taken by nature to ensure the production of grass is truly wonderful. Though the leaf be trodden down or consumed, the roots still increase; and the stalks which support the flowers, are seldom eaten by cattle, so that the seeds are always allowed to ripen. Some of the grasses that grow on very high mountains, where the heat is not sufficient to ripen the seed, are propagated by suckers or shoots, which rise from the root, spread along the ground, and then take root themselves. Grasses of this kind are called *Stolonif'erous*. Some others are propagated in a manner not less wonderful, for the seeds begin to grow in the calyx itself, which in grasses is called the Husk, and when complete, plants are formed there with little leaves and roots; these fall to the ground, where they take

root, and continue to grow like the parent plant from which they spring. In this case the grass is called Vivip'arous. There is a native species called Festu'ca vivip'ara, viviparous Fescue-grass, which grows in this way in every situation, whether on the tops of mountains or in plains: It is found in perfection in Scotland, on dry walls, and in the moist crevices of rocks.

EDWARD.

But what sorts of grass seeds do men eat?

MOTHER.

Wheat, barley, oats, rye, and corn of all kinds, are the seeds of different grasses. Wheat, Trit'i-cum hyber'num, is the grain of which bread is chiefly made; but it must first be ground into flour, or meal. Starch, and hair-powder, which is only ground starch, are also prepared from wheaten flour. Barley, Hor'deum vulga're, is with us used principally for making beer; but in Spain, where malt liquor is little known, they feed their horses with it, as we do with oats. The poorer people of England, Scotland and Ireland make use of Oats, Ave'na sati'va, ground into meal, for porridge; and in Scotland oaten bread is a common article of food. The inhabitants of Norway make bread of barley and oatmeal, which keeps thirty or forty years, and is even considered as the better for being

old. At the christening of a child, bread is sometimes made use of, that was baked in the time of its great-grandfather.

EDWARD.

Are all these grasses natives of England?

MOTHER.

The particular species which are most valuable are not native; but we shall find others of the same genera that are.

Couch-grass, the weed that our gardener finds so troublesome, is a species of wheat, *Trit'icum répens*, the roots of which have a sweet taste like liquorice: at Naples, they are sold in the market as food for horses, and are sometimes ground and made into bread. The seeds of the *Festu'ca fluitans*, floating Fescue, are very large and sweetish, and are gathered for the table in Poland, and some other countries, where they are called manna.

Wall-barley or Way Bennet, *Hor'deum muri-num*, is a weed very common by road sides, and is eaten by horses and sheep.

The animated Oats, that your aunt sometimes amuses you with, are the seeds of the *Ave'na fat'ua*, which grows wild in corn-fields.

The Sea-Lyme-grass, *El'ymus arena'rius*, which is found pretty commonly on some of our own

shores, grows abundantly in Iceland and Greenland, where the climate is too cold to allow the better kinds of corn to ripen; and the seeds are sometimes made into bread by the inhabitants of those miserable countries.

In the island of Rasay, one of the Scottish Western Isles, the fishermen use ropes for their nets made of the mountain Mel'ic-grass, Mel'icanu'tans, which grows plentifully there, and is remarkably tough.

The Sugar-cane and the Reed are also grasses. The former, *Sac'charum officin'arum*, is supposed to have been originally a native of Spain and Sicily, and to have been carried from thence by the Europeans to America and the West Indies, where it is now very extensively cultivated. The stem, which sometimes grows to the height of twenty feet, affords the juice from whence all our sugar is prepared. The canes or stems of the plant, when ripe, are bruised between the rollers of a mill, to squeeze out the juice, which is collected and put into large boilers, with a small quantity of quick lime, or strong ley of vegetable ashes: when this juice has been boiled to the consistence of a syrup, and carefully skimmed, it is drawn off and allowed to cool, in vessels which are placed above a cistern, and perforated with small holes, through which the impure liquid part, called molasses or treacle, escapes; while the remainder becomes a mass of small

and hard grains of a brownish or whitish colour, called moist or raw sugar. When this is imported into Europe, it is farther purified by an additional process, and converted into loaf or refined sugar, such as we use at breakfast.

The tops of the sugar-canes, and the leaves that grow upon the joints, make very good provender for cattle, and the refuse of the cane itself is used for fuel, so that no part of this plant is without its use.

The sugar-cane is by no means the only plant from which sugar is obtained. The juice of the *A'cer sacchari'num*, American Maple, yields it in such abundance, that American farmers manufacture it for their own use. The juice of the grape, also, when ripe, yields a sort of sugar, which is called sugar of grapes, and has lately been employed in France as a substitute for what is brought from the West Indies, though not so sweet or agreeable to the taste. In Mexico sugar is obtained from the *Aga've America'na*, American Agave; and at Kamschatka it is produced from the *Herac'leum Sphondyl'ium*, Cow-parsnip, and *Fu'cus sacchari'nus*, a species of sea-weed called Dulse. Several roots also yield sugar; as the common beet, turnip, carrot, and parsnip.

The Sea-reed, *Arun'do arena'ria*, grows on the driest sandy parts of our sea-shores, and is so useful in binding the sand, and preventing it from

being blown into the neighbouring fields, that Queen Elizabeth forbade the extirpation of it. The Chinese sailors, in rainy weather, use large hats, jackets, and trowsers, made of reeds laid close together, from which the rain runs off, as from the feathers of water-birds.

The Bamboo, a native of the East Indies, is another species of reed, *Arun'do bam'bos* of Linnæus, the stalks of which are almost solid when young, but become hollow as they grow older, except at the joints: they sometimes measure fifteen inches round, and sixty feet in height; and being strong, durable, and very light, are much used in the construction of buildings, and for making furniture. They serve also in the East for the poles that support a sort of litter or bed, called Palanquin, which is carried about by men, and used like a sedan-chair in this country; only that the palanquin-bearers put the poles upon their shoulders, instead of holding them in their hands like our chairmen.

In Malabar, Bamboos are trained over iron arches, and when they have attained a curved form, they are used to support the canopies of the palanquins; and a lofty bamboo arch of this description is considered of great value.

EDWARD.

But if the stems are hollow, how can they be so strong?

MOTHER.

I am not surprised at your question ; the reason is, that the same quantity of matter acquires much greater strength, by being disposed in the form of a hollow cylinder, than if it were compressed into a solid one, which would of course be much thinner and weaker. The woody part of the smaller roots of trees is generally in the centre, which makes them pliable ; while in the trunk it stands round the centre, at some distance from it, and thus gives great strength to the stem, and is favourable to its upright growth. We see another instance of the same design in bones, and in the feathers of birds ; the strongest bones, as those of the legs of most animals, being hollow : and the hollow quills, — which are exceedingly light, that the bird may be enabled to fly the better, are wonderfully strong, and much less apt to bend than if contracted into a solid cylinder.

When the joints of the bamboo are bored through, they serve for water-pipes ; and walking-sticks and fishing-rods are made of the smaller stalks.

EDWARD.

Are not the chairs in your room made in imitation of bamboo ?



Dactylis glomerata — *Rough Cocks-foot*.

Class III. *TRIANDRIA* — Order *DIGYNIA*.

Sowerby sc.

MOTHER.

They are — except the seats, which are made of Bull-rushes, *Scir'pus lacus'tris*, a plant of this class that grows abundantly in clear ditches and streams in England. Cottages are sometimes thatched with these rushes, and cattle eat them when other food is scarce.

EDWARD.

I should like to examine some of the grasses, they seem to be so useful.

MOTHER.

They are so very numerous, and their flowers so minute, that many persons neglect them altogether, and confine themselves to more striking plants. This arises in part also from the great similarity that seems at first sight to exist between most of the species; but this apparent resemblance will vanish when you become acquainted with the parts of which the flowers are composed, which you can very easily do with the assistance of a microscope. I should advise you, however, not to examine many grasses, until you are better acquainted with botany in general. But to give you some idea of their structure, we will now look at one that is very common, the *Dac'tylis glomera'ta*, rough Cocksfoot. [See PLATE 5.] I have already told you that the calyx of most of the grasses is

called the husk ; in this instance it is composed of two leaflets, which are called *Valves* ; they are both keeled, or shaped like a little boat, and the inner one is larger than the other. The calyx contains several florets collected into an oblong spike, called a spiket. The blossom is composed of two petals, which are also called valves ; they are concave and sharp-pointed, the lower one a little longer than the upper : there are two nectaries, spear-shaped, and tapering to a point ; three stamens, the filaments like hair, supporting oblong anthers forked at each end : the germen is egg-shaped, with two styles spreading out, and feathered summits. There is no seed vessel, but the blossom closes over the seed until it is ripe. In some species there is one floret in each calyx ; in others four or five, sometimes more. There are but two native species of *Dac'tylis*, *stric'ta* and *glomera'ta*. In our plant, which is of the latter species, the flowers are crowded together in groups, without any regular order, called *Panicles* ; and they all point one way. In rainy seasons the florets sometimes become viviparous. This grass has been much cultivated by farmers : if suffered to grow tall, it is very coarse ; but when kept short, it makes a valuable sheep pasture, and grows very fast. In Norfolk, it was found by experiment that this plant shot up four inches in less than three days. It grows at

midsummer in droughts, when almost every thing else is burnt up.

The ancient Romans used, on some occasions, to bestow a crown of grass upon their generals: and this reward for their services, though of so little value in itself, was one of the most honourable; for it was never given but for some signal exploit, when, through the courage and skill of the general, an army reduced to the last extremities had been saved from destruction.

Besides the crocus and the grasses, there are several other plants in this class, which you will find growing wild. Do you remember how much pleased you were last winter, in Devonshire, with the plant in the woods that had the pretty little flowers growing on the middle of the leaves?

EDWARD.

Oh yes! and it had beautiful red fruit, that looked like cherries. What was the name of it?

MOTHER.

Butchers'-broom, *Ruscus aculeatus*. It is in the class Triandria of Withering's arrangement; but as the stamens and pistils are not in the same flowers, nor even upon the same plants, Linnæus has placed this genus in the twenty-second class, Dioecia. In general the berries are not larger than black currants, but the warmth of the climate

in Devonshire increases their size. In Italy, the plant is made into brooms, which the butchers use for sweeping their blocks; and from this circumstance it has obtained its English name.

Withering places the genus *Carex* or sedge in this class, though it properly belongs to the twenty-first, *Monoecia* of Linnæus. Most of the species grow on the banks of rivers, ditches, and ponds; and if suffered to increase, will quickly fill up any piece of water. They have creeping roots, which easily make their way through swampy ground, and hence they are often found in meadows. In Italy the leaves of the sharp Vernal *Carex*, *Carex acuta*, are used by glass-makers, to bind round their flasks for wine and oil.

CONVERSATION THE FIFTH.

CLASS 4. TETRAN'DRIA. — I'LEX AQUIFO'LIUM, COMMON HOLLY, EXAMINED. — CLOTHIERS' TEASEL. — MADDER. — BIRCH-TREE. — ALDER. — DUTCH MYRTLE. — BOX. — CENTUN'GULUS MIN'IMUS. — MISELTOE. — PARASITICAL PLANTS. — ROSE-COLOURED BALSAM-TREE. — FLOWER OF THE AIR. — THE GREAT FLOWER, RAFFLE'SIA.

MOTHER.

WELL, Edward, if you are inclined to begin the fourth class, Tetrandria, to-day, bring me a piece of Holly from the garden, and we will compare it with the description.

EDWARD.

Is Holly a native plant, mamma?

MOTHER.

Yes, one of the species grows wild in England. The botanical name is *Ilex Aquifo'lium*: and it is in the order *Tetragynia* of this class.

EDWARD.

I thought that all the leaves of holly were prickly, but here are some quite smooth.

MOTHER.

It has been observed, I think by Linnæus, that the lower branches, within the reach of cattle, bear thorny leaves; while the upper ones, which do not want a defence, are without thorns. —

- “ Below, a circling fence, its leaves are seen
 “ Wrinkled and keen,
 “ No grazing cattle through their prickly round
 “ Can reach to wound;
 “ But as they grow where nothing is to fear,
 “ Smooth and unarmed the pointless leaves appear.” *

EDWARD.

But would cattle eat the leaves if they had no thorns?

MOTHER.

They would; and in winter, when other food is scarce, the upper boughs, that have smooth leaves, are sometimes cut down, and strewed upon the ground to feed deer and sheep. They peel off the bark also very nicely, and eat it with the smooth leaves.

The wood of the holly is remarkably white and hard, and takes a fine polish: it is much used by inlayers and engravers on wood, and some of the pretty Tunbridge ware is made of it. Holly planted in hedges makes a very durable as well as ornamental fence.

* Southey.



Calyx

Flower

Berry

a Seed

Ilex Aquifolium—Common Holly.

Class IV. TETRANDRIA—Order TETRAGYNIA.

EDWARD.

Will you now read the description of the holly, while I look at the flower?

MOTHER.

In the genus *I'lex*, [see PLATE 6.] the calyx is a very small cup, which has four or five teeth at the edge. The blossom is of one petal, generally with four divisions, but there is some variety in this respect: the segments roundish and spreading out. The stamens are four, shorter than the blossom. The germen is roundish; and there are four summits, but no styles. The seed vessel is a roundish berry, containing four very hard seeds. The leaves in our species, *Aquifo'lium*, are egg-shaped, thorny, and evergreen, surrounded by a thickened border; and, in the tree from which this specimen was taken, they are what is called variegated, the leaves in the wild state not being stained with white, but of an uniform dark green colour. The berries are of a bright scarlet.

EDWARD.

I do not understand what is meant by evergreen?

MOTHER.

Plants which retain their green leaves all the year, in winter as well as in summer, are called so.

In the Indies almost all the trees are evergreen,

and have broad leaves; but in our cold regions most trees cast their foliage every year, and such as do not, have narrow and sharp leaves: it is supposed that if the leaves were broader, the snow which falls during the winter would collect among them, and often break their branches by its weight; but their slenderness prevents this effect, by allowing the snow to pass between them. This precaution in their structure would be unnecessary in India and other countries where snow is not known.

I will now tell you of a few other plants in the class Tetrandria. The Clothiers' Teasel, *Dip'sacus fullo'num*, is very much cultivated in the west of England, and is of the greatest value in cloth manufactories. The heads of flowers are fastened round the edge of a large broad wheel, which is kept turning, while the cloth is held against them, and the crooked awns, with which they are furnished, raise the knap of the cloth.

EDWARD.

What are the awns?

MOTHER.

They are slender, sharp bristles, such as you see growing from the husks of barley and oats, and which you call the beard. — It is supposed that one use of the awn is, to attach the ripe seeds to the coats of animals, that they may be more widely

dispersed. In this species of teasel, the awns are stiff, strong, and hooked backwards at the ends; which is the reason that the plant is so useful to clothiers.

There is another plant, called Dyer's Madder, *Ru'bia tincto'rum*, common in the west of England, the root of which affords a very beautiful scarlet dye; but what is cultivated in Holland is considered by dyers as better than that of other countries. Madder has the property of tinging with its red colour the milk, and even the bones, of the animals that feed upon it.

The white Birch, *Bet'ula al'ba*, in this class, according to Withering*, is very useful to the inhabitants of the north of Europe: it endures the severity of cold climates better than any other tree; and the seeds, which are furnished with little wings, are often carried by the winds to the tops of buildings, and of high rocks, where they take root and grow. The sap or juice obtained from the trunk in spring is said to make a pleasant wine, with the addition of sugar; and in the northern parts of Lancashire, the young twigs are made into brooms, which are exported to different countries. The bark has the singular property of being more firm and durable than the wood itself. A French traveller †, in passing through Lapland, where there are vast forests of birch,

* In class twenty-one, *Monoecia*, of Linnæus.

† M. Maupertuis.

observed, upon examining the trees which had been blown down by the storms, that in several instances the wood was entirely gone; the trunks, though to all appearance solid, consisting only of an empty shell of bark. In Norway, Sweden, and Russia, this bark is cut into square pieces like tiles, to cover the roofs of the houses; the Swedish fishermen make shoes of it; the inhabitants of Kamschatka, hats and drinking cups; and the people of Canada, canoes. An essential oil is extracted from the bark of the birch in Russia, which is used in preparing Russia leather, and gives the peculiar scent to it. The inner silky bark of this tree was used for writing on, before the invention of paper.

The catkins and seeds of the dwarf Birch, *Betula nána*, are the principal food of grouse and ptarmigans in northern countries.

The Alder-tree, which you may see on the banks of rivers, is another species of *Betula*, the *Alnus*, the wood of which is soft and brittle, but lasts a long time under water, and is therefore used for pumps and water-pipes, and for beams to lay under the foundations of buildings in marshy places. For this reason the Alder-tree is very much cultivated in Flanders and Holland. It makes, too, the best charcoal for gunpowder.

The Dutch Myrtle, *Myrica gale*, which is found in our bogs, is in the class *Tetrandria*, accord-

ing to Withering.* The flowers grow in little clusters, which are called catkins; and when these are boiled in water they throw up a scum like bees' wax, that would make candles if collected in sufficient quantity. In America, candles, soap, and sealing-wax, are actually made from another species, called Candle-berry Myrtle, *Myrica cerifera*.

The common Box, *Buxus sempervirens*, with which part of our garden is bordered, is also placed by Withering in the fourth class.† It is an ever-green, and the slowest growing of all our trees, which renders its wood particularly hard, and of a fine close texture, and therefore very valuable for musical and mathematical instruments, and for the finer kinds of turners' ware, that require wood of a smooth grain. The beautiful engravings of animals and birds, by Bewick, are cut upon box-wood. The hardest wood is always of slowest growth, as in the oak and holly; and the softest grows the most rapidly, as the horse-chesnut and ash.

You have seen only small trees, — but the Box grows in great abundance, to the height of ten or twelve feet, at Box-hill, in Surrey; and at Boden-

* In the twenty-second class, Dioecia, and order Tetrandria, of Linnæus.

† In the class Monoecia, and order Tetrandria, of Linnæus.

ham, in Herefordshire, there is one tree more than twenty feet high.

EDWARD.

Will our borders ever be so tall?

MOTHER.

No; what is used for garden-borders is a dwarf,—or a very small variety, but not a different species, of the plant that I have just mentioned. It never grows to any great height.

EDWARD.

How did you find out so many curious things about plants?

MOTHER.

By reading different botanical works and books of travels, which I will lend you when you are old enough to understand them; but you will find that I know very little, indeed almost nothing, of the subject, in comparison with many other persons, and less than you yourself can easily learn hereafter. I hope that if ever you become a good botanist, you will still recollect the lines that you heard sung last night:—

What though I trace each herb and flower,
That drinks the morning dew;
Did I not own Jehovah's power,
How vain were all I knew!

But there are some other plants of the fourth class, that I must not forget;—the Pimpernel Chaffweed, *Centunculus minimus*, the smallest of all the British plants that have distinct flowers, the stem being hardly an inch high; and several parasitical plants.

EDWARD.

What does that mean?

MOTHER.

Parasitical plants are those which are produced upon the trunks, branches, or any parts of other vegetables; and which, in some instances, will not grow in the ground, as is the case with Mistletoe, and some kinds of funguses. The Mistletoe, *Viscum album**, is an evergreen shrub, that grows in great perfection on apple-trees. Nobody has ever yet succeeded in making it take root in the earth, but if the berries, when fully ripe, are rubbed on the smooth bark of almost any tree, they will adhere closely, and produce plants the following winter.

Parasitical plants have been lately discovered, which grow upon others that are themselves parasites, but they are very rare.

There are parasites of another kind, less properly called so, which at first take root in the ground, and afterwards fasten themselves to trees, or other

* In the twenty-second class, Dioecia, of Linnæus.

substances within their reach, where they strike out roots from their own stems.

EDWARD.

Then Ivy, I suppose, is a parasitical plant?

MOTHER.

Yes, it is one of those I have just mentioned; and you shall hear more about it, when we come to the fifth class, to which it belongs. But some of the most remarkable native parasites are of the genus *Cuscuta*, or Dodder, in the second order of the fourth class: they have no leaves, but only a slender stalk, with which they lay hold very closely of some plant stronger than themselves, from whence they draw all their nourishment. There are five native species, which grow upon beans, hops, flax, heath, and the nettle; frequently in such profusion as to destroy the plant that supports them.

There is a parasitical tribe peculiar to hot climates, the genus *Epidendrum* of Linnæus*, one species of which, called *Flos aëris*, or Flower of the Air, is particularly curious. It is found in abundance in the East Indies, beyond the river Ganges, and it grows and even blossoms in the air, when hung up, without attaching itself to any solid body. The smell of the flowers is so delightful,

* In the twentieth class, Gynandria, of Linnæus.

that the inhabitants suspend it from the ceilings of their rooms, where it will vegetate for years.*

Mirbel, a French botanist, says, that in North America there are even parasitic trees, which grow on other trees. The long roots of the *Clusia rosea*, rose-coloured Balsam-tree, a parasite of this kind, descend from the top of the trees upon which they grow, to the ground; and sometimes several of these roots become engrafted into each other, and are covered with the same bark, so as to form a great case, in which the trunk of the tree that supports the *Clusia* in the air is enclosed.

Besides those I have mentioned, there are some parasites which grow upon the roots of other plants; and one of these affords the most extraordinary flower that has ever yet been discovered. It was found in the island of Sumatra, in the year 1818, by the late Dr. Joseph Arnold, who thus gives an account of his discovery in a letter to one of his friends:—

“ Here, at Pulo Lebbar, on the Manna river, I rejoice to tell you, I happened to meet with what I consider as the greatest prodigy of the vegetable world. I had ventured some way from the party, when one of the Malay servants came running to me with wonder in his eyes, and said, ‘ Come with me, sir, come! a flower, very large, beautiful, wonderful!’ I immediately went with the man about

* Willdenow’s “ Principles of Botany,” p. 263.

a hundred yards in the jungle" — this name is given in India to wild bushy underwood — "and he pointed to a flower growing close to the ground, under the bushes, which was truly astonishing. My first impulse was to cut it up, and carry it to the hut. I therefore seized the Malay's parang, a sort of instrument like a woodman's chopping-hook, and finding that it sprang from a small root which ran horizontally, about as large as two fingers, or a little more, I soon detached it, and removed it to our hut. To tell you the truth, had I been alone, and had there been no witnesses, I should, I think, have been fearful of mentioning the size of this flower, so much does it exceed every flower I have ever seen or heard of; but I had Sir Stamford and Lady Raffles with me.

"The whole flower was of a very thick substance, the petals and nectary being in but few places less than a quarter of an inch thick, and in some places three quarters of an inch; the substance of it was very succulent. —

"Now for the dimensions, which are the most astonishing part: — it measured a full yard across; the petals, which were roundish, and five in number, being twelve inches in length, and it being about a foot from the insertion of the one petal to the opposite one; Sir Stamford, Lady Raffles, and myself, taking immediate measures to be accurate in this respect, by pinning four large sheets of paper toge-

ther, and cutting them to the precise size of the flower. The nectary, in the opinion of all of us, would hold twelve pints, and the weight of this prodigy we calculated to be fifteen pounds. —

“ A guide from the interior of the country said that such flowers were rare, but that he had seen several, and that the natives called them *Krúbut*, or the Great Flower.” — You may judge how well they deserve this name, from the dimensions of the buds, which are about the size, and have very much the appearance of moderate cabbages.

Mr. Brown, who has described the specimens of this gigantic Flower, that were sent to England*, was of opinion that the root on which it grew belonged to a species of *Vi'tis* or Vine; and this has since been ascertained to be correct. He has named the genus *Raffle'sia*, in honour of Sir Stamford Raffles, then governor of the East India Company's establishment at Sumatra; and the species, *Arnol'di*, in memory of Dr. Arnold, who unfortunately died almost immediately after its discovery.

* Transactions of the Linnæan Society, vol. xiii. part 1.

CONVERSATION THE SIXTH.

CLASS 5. PENTAN'DRIA.—GENUS SOLA'NUM, POTATOE.—
 — WOODY AND GARDEN NIGHTSHADE.— DEADLY
 NIGHTSHADE, A DIFFERENT GENUS.— AT'ROPA.—
 IVY.—BUCKTHORN.—MYOSO'TIS PALUS'TRIS, WATER
 MOUSE-EAR EXAMINED.— VINE.— CURRANT AND
 GOOSEBERRY.— COFFEE-TREE.— TOBACCO.— VIOLET.

—◆—

MOTHER.

THE fifth class, Pentandria, comprehends more than a tenth part of all the plants that are known at present; and some of our most useful vegetables belong to it. I shall begin with the Potatoe, *Sola'num tubero'sum*, which is in the order *Mono-gynia*.

EDWARD.

Do Potatoes grow wild in England?

MOTHER.

No; they were brought from America, by Sir Walter Raleigh, who, on his return from that part of the world, about the year 1597, distributed a number of potatoes in Ireland, where they were

planted, and multiplied very fast. It is said that they were afterwards brought from Ireland into England; and that a ship, laden with potatoes, being wrecked on the coast of Lancashire, the cultivation of them soon became general. But the native country of the potatoe is still doubtful; and all that can be said with certainty is that it came from South America.

It is remarkable that Virginia, the country which was at one time supposed to have afforded the potatoes first brought to Europe, was afterwards saved from famine by a supply of them from Ireland. Linnæus took great pains to introduce the culture of potatoes into Sweden, but it was not until near the end of the last century that it became general in that country.

Go and ask the gardener for some of the blossoms, and you will see that they are in the first order of the fifth class: you already know that what we eat is a part of the root.

EDWARD.

Here is one bunch with white, and another with purple flowers. Are they only varieties?

MOTHER.

That is all; the plants with white flowers are said to have white roots, and those with purple, red ones. I have been told that in many parts of

Germany, the purple-flowered potatoes are preferred to the white; and in Saxony, where they are cried about, the colour of the blossom is always mentioned.

EDWARD.

And these little green balls; are they the seeds?

MOTHER.

They are the seed-vessels, and contain the seeds within them. If the seeds of any one plant were sown, they would produce a great many varieties of potatoes; but in general this vegetable is propagated by the roots, which ensures the production of plants of the same quality.

Look at the anthers, and you will perceive that they are nearly united at top in a point, and that there are two little holes in each of them: this is what forms the principal distinguishing character of the genus *Sola'num*, of which there are more than three hundred species; but only two of them are natives of England, the *Dulcama'ra* and *Ni'grum*. You will, perhaps, be surprised to hear that the woody Nightshade, which grows wild in our hedges, and bears the pretty scarlet berries that I have so often told you were poisonous, belongs to the same genus as the potatoe: it is the *Sola'num Dulcama'ra*.

The garden Nightshade, *Sola'num ni'grum*, is also poisonous; and even the smell of it is said to

occasion sleep: the flowers are white, and the ripe berries black. The Deadly Nightshade is another plant in the same class and order, and from its English name you might suppose it to be of the same genus also; but its flower is very different: and this may serve to show you how necessary it is to use the botanical names, in speaking of plants, when we wish to distinguish them with accuracy.

EDWARD.

What then is the botanical name of Deadly Nightshade?

MOTHER.

Atropa belladonna. It grows wild in Europe, particularly in England and Austria; and every part of it is poisonous.

The Tomato, or Love-Apple, that you often see in fruit shops, is the *Solanum Lycopersicum*; the berry is about the size of a plum, and is used in soups. In Jamaica, another species, the *Solanum Melongena*, is very much cultivated, and is called the Egg-plant, or Vegetable-egg, from the fruit, which in shape and size is very like the egg of a hen.

Our common Ivy, *Hedera Helix*, is also in the same class and order, *Pentandria Monogynia*. It is the only native species of *Hedera*, and is the latest flowering of all our plants, for it blossoms in October and November; but the berries are not ripe until the following spring.

EDWARD.

But, are not there two kinds of ivy growing on the old church?

MOTHER.

Although the leaves are different, they belong in reality to the same species. When the common ivy trails on the ground, the branches are small and weak, and the leaves have three divisions; but when it climbs up walls or trees, the plant grows much stronger, and the figure of the leaf is changed to egg-shaped. The roots of ivy make beautiful cups and boxes, and even tables are sometimes made of them.

The Buckthorn, *Rhamnus catharticus*, which belongs likewise to this class and order, grows wild in woods and hedges in various parts of Europe. The unripe fruit is sold under the name of French berries, and affords a juice that is used for staining maps and paper yellow. The juice of the ripe berries, mixed with alum, forms the sap-green employed by painters; and if the berries are gathered late in autumn, their juice is purple. The bark of the stem dyes a beautiful yellow colour. The unripe fruit of another species, the yellow-berried Buckthorn, *Rhamnus infectorius*, a native of the south of Europe, is said to give the yellow colour to Turkey or Morocco leather.

In Africa, the negroes make bread of a sweet



Calyx magnified.

Blossom opened and magnified.

Myosotis palustris — *Water Mouse Ear.*
Class V. *PENTANDRIA* — Order *MONOGYNIA*.

Sowerby sc.

yellow berry, the fruit of the *Rham'nus Lo'tus*, which they call Tomberongs. When the berries are dried, they pound them into meal, and make cakes of it, which, when dried in the sun, have the colour and taste of gingerbread.

EDWARD.

Shall we not examine a plant to-day?

MOTHER.

Yes, certainly; and I am glad you have reminded me of it: the best way to learn botany is to examine plants themselves. Here is a piece of water Mouse-ear, *Myoso'tis palus'tris*:—[see PLATE 7.] tell me its class and order.

EDWARD.

I do not see any stamens; where are they?

MOTHER.

Pull off one of the blossoms, and cut it open with your penknife.

EDWARD.

Now I do see five stamens; but the anthers are almost covered by the little yellow parts that met in the middle before I opened it.

MOTHER.

These form one of the characters of the genus *Myoso'tis*;—but you have not told me the order?

EDWARD.

It is the first, Monogynia, for I see only one pistil, which has remained in the calyx.

MOTHER.

Very well. The calyx is a cup, with five sharp oblong divisions. The blossom is of one petal; the border has five blunt divisions, very slightly notched at the ends; the mouth or upper part of the tube is closed with five small projecting parts, called Valves: the stamens are placed in the neck of the tube, and the filaments are very short; the anthers small, and covered by the valves. The style is as long as the tube of the blossom. There is no seed-vessel, but the cup enlarges as the seeds ripen, and contains them within it. In this species, *Myosotis palustris*, the leaves are spear-shaped, the seeds smooth, and the calyx funnel-shaped, with straight and close-pressed hairs.

EDWARD.

I think I shall always know Mouse-ear, when I see it, by the little valves in the middle of the blossom.

MOTHER.

These do form one of the principal characters of the genus: but you must attend besides to the other circumstances that I have mentioned; for there are other genera of the same class and order, which are also furnished with valves.

The Vine, *Vítis*, is a genus of this class. The common species, *vinif'era*, which produces grapes, is a native of the south of Europe, where a great many varieties are cultivated, from which different kinds of wine are obtained. The fruit, you know, is generally produced in hot-houses in this part of England; but it grows and ripens very well in the open air in some of the southern counties. And formerly, in the neighbourhood of London, the vine flourished so well, that wine was made there in considerable quantities. — Lee and Kennedy's nursery-garden, at Hammersmith, is still called the vineyard, from the excellence of the grapes which were at one time produced there.

The Currant and Gooseberry are also in the class Pentandria, and order Monogynia. Their generic name is *Ríbes*.

EDWARD.

Then are currants and gooseberries of the same genus? — They look very different from each other.

MOTHER.

When you examine the plants, you will find that their botanical characters agree. Each of the little yellowish flowers of a currant or gooseberry-bush has five petals, which, as well as the stamens, are fixed to the calyx: the style is cloven; and the blossom is superior, that is, it grows above

the germen; and this germen afterwards becomes the fruit, and contains within it little hard seeds, dispersed through a pulpy substance; — as you will find if you open a currant or gooseberry.

There are several species of *Ribes*, some producing different sorts of currants, and others gooseberries. All the currant kind are without thorns, and bear clusters of flowers and fruit: but the branches of the gooseberry are thorny; and the flowers are, in general, what is called Solitary, — only one growing from the same part of the plant, instead of a bunch.

EDWARD.

Are they all natives of England?

MOTHER.

No; there are not more than six or seven native species; two of gooseberries, and four or five of currants. Both fruits succeed very well in our gardens.

It is remarkable, that no thin-skinned fruits, such as grapes, cherries, currants, strawberries, plums, apricots, and peaches, nor even common apples and pears, ever come to perfection in very hot climates; although a greater number of vegetables are calculated to bear a high degree of warmth, than to endure cold.

The Coffee-tree is of the genus *Coffe'a*, in this class and order: the oriental kind, *Coffe'a arab'*

ica, is a native of Arabia; and a second species, occidenta'lis, grows in the West Indies. The trees are evergreen, but seldom grow higher than seventeen or eighteen feet. The fruit, which is the only useful part, resembles a small cherry, and when fit to be gathered is of a deep red colour: it contains two seeds, and these, when roasted and ground, are what we make use of. They are collected in large quantities, and sent to all parts of Europe. It is said that coffee was first sold in England about the year 1680, by the servant of a Turkish merchant.

Tobacco, *Nicotia'na tab'acum*, is also in the same class and order; and the custom of smoking is said to have been introduced in England by Sir Walter Raleigh, after his discovery of Virginia, about the year 1536. King James the First had such a dislike to the fumes of this plant, that he wrote a pamphlet against it, which he called a "counterblast to tobacco."—It is sold every where in China, where it is considered next to tea as the best preservative of health, and is used by all ranks of people. In Italy it is cultivated for sale; but we see the plant in England only in greenhouses. It flowers in July and August, and bears a great number of long, tubular, rose-coloured blossoms.

There are two other genera in the first order of the fifth class, that you will be glad to hear of: the Primrose, *Prim'ula*, and the Violet, *Vi'ola*. You will perhaps be surprised to hear that the

Auricula, *Prim'ula Auric'ula*, so often cultivated in gardens, and a native of Switzerland, belongs to the same genus as the Cowslip, *Prim'ula ve'ris*, and the Primrose, *Prim'ula vulga'ris*, which both grow wild in England, and appear in the spring when violets are in blow.

EDWARD.

Don't you love violets? they smell so sweet, and grow in such pleasant shady places.

MOTHER.

There are five or six other native species, besides your favourite, the Sweet Violet, which is called *Vi'ola odora'ta*: the Heart's ease or Pansy, *Vi'ola tric'olor*, is one of these, though its flower is so different in appearance from that of the sweet-scented species.

CONVERSATION THE SEVENTH.

CLASS 5. CONCLUDED. DESCRIPTION OF AN UMBEL. —
 UMBELLIFEROUS PLANTS. — ELDER. — TEAK-WOOD.
 — TAMARISK TREE. — SUMACH. — FLAX, ITS USES. —
 PAPER.

 MOTHER.

By far the greater part of the order Digynia, in the fifth class, is composed of what are called Umbelliferous or Umbel'late plants, which are so named from their peculiar structure. From the top of a straight stalk there grow several smaller ones, called spokes, which spread out from it, as from a centre, like the wires in the inside of an umbrella when it is open; and the plants are called Umbel'late, from the word umbella, which is the Latin for an umbrella. Each set of spokes forms what is called an Umbel; and every spoke is terminated by an Umbellule, or little umbrella, which consists of a number of smaller stalks, with a single flower at the end of each. You cannot have better examples of this tribe than the common Hemlock and garden Parsley.

Several of the umbelliferous plants are remarkable for their uses as food or medicine, or else for their poisonous qualities. The roots of most of those which grow in dry soils have an aromatic smell and taste; but in moist situations, or in water, they are nearly all poisonous.

The water Cow-bane, *Cicu'ta viro'sa*, grows in pools and rivers, and is one of the most violent of vegetable poisons. Early in the spring cows are often killed by eating it; but as the summer advances, the smell becomes stronger, and they carefully avoid it. Linnæus mentions, in his Lapland Tour, that he was told of a disease amongst the cattle at Torneo, which killed a great many of them in the winter, but was still more prevalent in the spring, when they were first turned out to grass; and which the inhabitants could not account for. On examining the place where the cattle had fed, he found it to be a marsh, in which the *Cicu'ta viro'sa* grew in abundance; and by pointing out the plant, he enabled the people to guard against the danger ever after.

The water Parsnep, *Si'um latifo'lium*, and water Hemlock, *Phellan'drium aquat'icum*, both natives of England, are also very poisonous. The Carrot, *Dau'cus Carro'ta*; Parsnep, *Pastina'ca sati'va*; Angelica, *Angel'ica Archangel'ica*; Carraway, *Ca'rum Car'ui*; Coriander, *Corian'drum sati'vum*; Parsley, *A'pium Petroseli'num*; and Celery, *A'pium grave'*

olens; most of which you are acquainted with, are all umbelliferous plants, and grow wild in England. The Angelica grows very abundantly in Greenland, where the inhabitants consider the inner part of its root and stalk as a great delicacy. In cold climates it has a much better flavour than when it grows in warmer countries, a circumstance common to several eatable plants. The gardeners near London propagate great quantities of this plant, which they sell to the confectioners, who make a sweetmeat of the tender stalks.

In Poland, the poor people make a fermented drink, which they use instead of ale, from the leaves and seeds of the Cow-parsnep, *Heracleum Sphondylium*, another umbellate plant, which is a troublesome weed in our meadows; and the Kamschatkans and Russians peel its stalks and eat them.

EDWARD.

Do Carrots grow wild in the fields?

MOTHER.

The garden Carrot is nothing more than the wild carrot, or Bird's nest, so much improved by cultivation that you would hardly suppose them to be the same. The roots of the garden carrot are very nourishing; and at the Cape of Good Hope the Dutch planters cultivate large fields of carrots for food for cattle.

But do you think you can distinguish an umbelliferous plant from any other, by the description that I have given you? Go out and try if you can find one.

EDWARD.

Here, mamma, are two, which I found at the side of the field, next the road.

MOTHER.

You have made a very good attempt, my dear; and are right in one of them, the Shepherd's needle, *Scan'dex Pec'ten*. — And I am not surprised at your mistaking the other, which is the common Elder, *Sambu'cus Eb'ulus*, for it certainly has the general appearance of an umbelliferous plant; but if you look again, you will perceive that it has not exactly the structure which I have described to you; for, though all the principal ribs grow from the same stalk, like those in the umbel of the shepherd's needle, there are no umbellules, the smaller stalks not being regularly arranged.

The character of the umbelliferous tribe is in part taken from the structure of the flower itself. In umbellate plants, the corolla has five petals, with a stamen between every two; and two styles, each with a single summit, — which rise from the centre of the flower, and remain after the petals and stamens fall off, so as to crown the two seeds. The

calyx in this tribe is called an Involucrum, and is in general not very distinct.

Now look at your elder, and you will see that the blossom, instead of having five petals, is of one piece, divided into five parts; there are, it is true, five stamens; but there is no style; and you will more frequently find three summits than two. The fruit of the elder is a soft berry; but in the umbelliferous tribe, it consists of two dry and naked seeds.

The branches of the elder tree are full of a very light kind of pith, but the wood of the trunk is uncommonly tough and close-grained. You will generally find that the stems which contain the most pith are protected on the outside by wood that is peculiarly strong and elastic.

EDWARD.

Why does the gardener spread elder leaves near mole-hills?

MOTHER.

To keep away the moles, which will not come near elder. You may have seen the coachman also putting branches of it in the horses' heads to keep off the flies, for few insects can endure the smell of this plant. The faculty that most animals possess, of distinguishing plants from each other, by the smell or taste, and of avoiding those which are noxious, is very extraordinary, and of great import-

ance: — if all plants were equally wholesome to animals of every kind, some animals might deprive others of subsistence; whereas, at present, each kind has its appropriate food, and cannot feed on vegetables which do not accord with their senses of smell or taste, without suffering.

The common Elm-tree, *Ulmus campestris*, is in the order Digynia of this class. It is a native of Britain, and the wood is very serviceable, where it can be kept constantly either dry or moist. It is used for water-works, mills, pumps, and keels of boats, from its not being disposed to split or crack; and coffins also are made of it, because it lasts longer under ground than most other timber. The clearness of the grain makes elm particularly fitted for carved works, and architectural ornaments. — Silk-worms devour the tender leaves of the tree with great avidity: the flowers have a smell resembling that of violets, but, in this country, they have not been known to produce perfect seeds; and the tree is propagated by suckers and grafts. The city of Ulm, in Germany, derives its name from the great number of Elm-trees that grow in its neighbourhood.

The North American Indians hollow the trunks of the red Elm, *Ulmus americana*, into canoes, some of which, made out of one piece, will hold twenty persons. Bears and wild cats take up their

abode in the hollow stems of these trees during the winter months.

The Samphire, *Crith'mum marit'imum*, is in the same class and order with the Elm: — it grows wild on the sea-shore, but is never covered by the water; and a knowledge of this was useful, in a way that might not have been expected, to some French sailors, who were shipwrecked not long ago, near Beachy-head, in Sussex. The vessel, to which these poor men belonged, was driven on shore by a storm, in the month of November, 1821; the whole crew were washed overboard; — and only four escaped from the sea by climbing to the top of a heap of rocks which had fallen from the cliff above. It was a very dark night; and they expected every moment to be swallowed up by the waves, when one of them found a plant, growing among the rocks, which he knew to be samphire. As this convinced them that the tide did not rise so high, they knew that they were safe, and did not move from the place till day-break, when they were seen by the people on the cliffs, who immediately came to their assistance.

I shall conclude to-day, by telling you something about a few curious foreign trees, and our own useful plant, the Flax, which are in the class Pentandria.

The Marking-nut tree, *Semicar'pus anacar'dium*, is a native of woody mountains in the East Indies.

It is a lofty tree, and bears a fruit which contains a black resinous juice, that is used in the East for marking linen. This is done by putting the linen over the nut, and pricking it till the juice comes through, which makes a stain that never washes out. The fleshy receptacle, when roasted, has the flavour of apples, and is eaten by the natives of India.

The forests of Java, Ceylon, and some other of the East Indian islands, afford a very valuable tree, called the Indian oak, or Teak-wood, *Tec'tona gran'dis*. The leaves, even of the young trees, are nearly two feet long, and more than a foot in breadth. The trunk grows to a great size, and the wood is the most useful timber of the East; it is supposed to be superior to every other for building ships, for the worms that destroy deal and oak do not injure it.

The order Trigynia contains, besides other genera, the Tamarisk-tree, one species of which, *Tam'arix gal'lica*, grows wild on the southern coast of England, — the Guelder-rose, *Vibur'num Op'u-lus*, — the Laurusti'nus, *Vibur'num Ti'nus*, — and the Sumach-tree, *Rhus*. The Varnish Sumach-tree, *Rhus Vernix*, produces a gum from which the Japanese prepare their beautiful black varnish.

The common Flax, *Li'nus usitatis'simum*, in the order Pentagynia of this class, is one of the most valuable of plants; for every kind of linen is

manufactured from the bark of its stalks; and linen, worn to rags, makes paper. It is said that the plant came originally from Egypt; but it is now found wild in many parts of England. The seeds afford linseed-oil, which is used in great quantities by painters; and after the oil has been pressed out, they form what are called oil-cakes, with which cattle are fattened. The linnet has its name from the *Li'num*, because flax-seed is its favourite food. It will interest you very much to read an account of the method of preparing flax for making linen.

EDWARD.

Is all paper made of linen rags?

MOTHER.

No; what we most commonly use in England is so; but there are several other kinds, made of different materials. Paper was first manufactured in Europe about the year 1300; and that which is made of linen appears to have been first introduced towards the beginning of the fourteenth century; but the inventor is not known. The first paper-mill in England was erected in 1588.

The ancient Egyptian paper was made of the inner coat of the stem of the *Papyrus*, *Cy'perus Papy'rus*, a species of rush, in the class *Triandria*, that still grows on the banks of the Nile. This

plant was much valued by the Egyptians, who applied it to several useful purposes, and it is often represented on their monuments. They made vases of the roots, and boats of the stalks woven together and coated over with some resinous substance. When they had peeled off the bark, they separated the inside of the stalk into very thin layers, of which they made paper, and a kind of cloth for dresses. Their mode of making paper was to place a number of these layers close beside each other, with as many more ranged across them, and then to wet the whole with water, which made the different pieces stick together. When this was pressed and dried it was equal to our paper in solidity and lightness. In China, paper is prepared from the bark of several different trees; among others, of the elm and mulberry, but chiefly of the cotton-tree. Great quantities of paper are now made in Europe from cotton rags; but this is not so good as that from linen. Our blotting-paper is made principally of woollen rags; and our coarse brown paper, of pieces of old rope. I have seen also paper that was manufactured of silk, straw, sea-weed, and even of leather; this last kind being particularly useful for packing, as it is water-proof, and does not easily tear or take fire.

The word Paper is derived from the papyrus, which was used by the ancients for writing upon; and from the general custom of writing upon the

leaves of trees, our books are still said to be composed of leaves. The English word Book comes from the Saxon boc or beech, because beechen tablets were formerly used to write on.

Liber, the Latin name for a book, signifies also the inner bark of a tree, which likewise the ancients wrote upon; and volumen, a roll, was the manuscript rolled up; — from whence come our words library and volume.

CONVERSATION THE EIGHTH.

CLASS 6. HEXAN'DRIA. — GALAN'THUS NIVA'LIS, SNOWDROP EXAMINED. — NECTARIES. — BARBERRY; ITS FILAMENTS. — SORREL. — AMERICAN ALOE. — INDIAN REED. — LARGE PLANTS OF HOT CLIMATES. — GREAT FAN PALM. — ARISTOLO'CHIA. — ADANSO'NIA. — CLIMBERS. — TENDRILS. — TERMS EXPLAINED. — LILIES. — BULBOUS ROOTS. — KAMSHATKA LILY.

EDWARD.

WHAT shall we do to-day, mamma? I hope we shall examine a plant in the sixth class.

MOTHER.

I believe, my dear, that the Snowdrop is one of the best examples you can have; for the flower is very remarkable, and the only species which is known, is a native of England.

EDWARD.

But the Snowdrop has done flowering long ago.

MOTHER.

Very true: it is one of our earliest spring flowers. You remember Mrs. Barbauld's beautiful lines,



Galanthus nivalis - Snowdrop.

Class VI. *HEXANDRIA* Order *MONOGYNIA*.

which I gave you to learn in February, when you brought me the first Snowdrop from the garden.

EDWARD.

Already now the Snowdrop dares appear,
The first pale blossom of the unripen'd year.
As nature's breath, by some transforming power,
Had changed an icicle into a flower;
Its name and hue the scentless plant retains,
And winter lingers in its icy veins.

MOTHER.

We cannot then procure a living plant at present, but I will read you a description of it, which you may compare with this drawing [see PLATE 8.], and you must not forget next spring to examine a real one. The flower has six stamens and one pistil; it is therefore in the class Hexandria, and order Monogynia. There is no cup, but instead of one a sheath, a kind of calyx, of which this plant affords a very good example: and there are six petals, three smaller than the rest, standing within the other three, and notched at the ends.

EDWARD.

How very different the small ones are from the other petals!

MOTHER.

For this reason they were considered by Linnæus as distinct from the petals, and called by him the

nectaries. In the snowdrop, these three inner parts of the flower, whether we call them nectaries or petals, form the distinguishing character of the genus, which is named *Galan'thus*.


EDWARD.

But when we were examining the wall-flower, you told me that the nectaries were little bodies surrounding the stamens.

MOTHER.

Yes; but I also told you, that nectaries had very different forms in different flowers. — The use of the nectary is very doubtful, but it is supposed to be, to contain the honey. In monopetalous flowers, the tube of the blossom itself answers this purpose; but in flowers of several petals, with open calyxes, which have no tube to hold the honey, there is in general a distinct part intended for that use.

In some genera, the nectary is a sort of horn or spur at the back of the flower, as you will see very distinctly in the larkspur and columbine: and there is a genus in the fifth class, called *Parnas'ia*, in which the nectaries are particularly beautiful. One species of this genus, the *palus'tris*, grows wild in England, and exhibits them in great perfection. There are five in every flower, placed alternately between the stamens, and each of them consists of a little heart-shaped substance, beautifully fringed with

bristles: every bristle bearing on its extremity a transparent yellow ball, in appearance like melted wax. Here is a little drawing that will give you some idea of their figure.  The English name of the *Parnas'sia palus'tris* is Grass of Parnassus.

But let us return to our snowdrop. — The filaments, in the genus *Galan'thus*, are very short, and the anthers end in a fine point like a bristle. The pistil is longer than the stamens; the style thread-shaped; and the germen is rather larger, roundish, and placed below the blossom, so that you can see it without pulling off the petals. The specific name of the snowdrop is *niva'lis*.

EDWARD.

You have not described the leaves or the root.

MOTHER.

It is not necessary to do so for the purpose of distinction, when there is but one species known of any genus. I have told you, you may remember, that the character of the genus depends upon the structure of the flower; and the distinctions of the species, principally upon differences between the roots, leaves, or other parts: — but as there is only one species of *Galan'thus*, we have not any others to compare it with, and cannot form a specific character.

EDWARD.

I like to examine plants that have but one species.

MOTHER.

It certainly is less difficult for a beginner, than when there are many; which is my reason for choosing such plants for you, when I can.

You already know that the Tulip is in the sixth class. There is one species, called the wild tulip, *Tu'lipa sylves'tris*, a native of England. It differs from the garden tulip, *Tu'lipa Gesneria'na*, which grows wild in the Levant, in having narrow leaves, a flower that nods or bends downwards, and is fragrant: the pollen also, on the anthers of the native species, is yellow, instead of black.

The garden tulip was first brought from Constantinople, about the middle of the sixteenth century, to Vienna; from whence it has found its way over all the rest of Europe.

The Pine-apple, *Brome'lia Ana'nas*, that you see in the hot-house; Lily-of-the-Valley, *Convalla'ria maja'lis*; Asparagus, *Aspar'agus officina'lis*; Hyacinth, *Hyacin'thus non-scrip'tus*; Daffodil, *Narcis'sus Pseu'do-Narcis'sus*; Polyanthus, *Narcis'sus Tazet'ta*; Barberry, *Ber'beris vulga'ris*; and Sweet-rush, *Ac'orus Cal'amus*; are amongst the plants in the first order of the sixth class. They are all natives of England, except the pine-apple, which is said to have come originally from South America; the fruit has its name from the resemblance of its

shape to the cone or seed-vessel of some of the pine-trees.

Asparagus was so highly cultivated by the ancient Romans in the neighbourhood of Ravenna, that Pliny mentions three plants so large as to weigh a pound.

The garden Hyacinth, *Hyacinthus orientalis*, is a native of the Levant. The flower, in its single state, was once admired on account of the regularity and equality of the petals; and double hyacinths were then no more valued than double tulips are now:—so that a Dutch florist at Haerlem used to throw them out of his collection; till, by accident, a bulb with double flowers attracted his attention, and appeared to be so beautiful, that he cultivated the plant, and propagated from it by off-sets. These double flowers were so much prized, that he sold them at a high price, and cultivated them with as much care as he had formerly taken to reject them: and hyacinths with double flowers came afterwards into such request, that from one to two hundred pounds have been given for a single root.

There is one circumstance relating to the Barberry that deserves particular attention. The flowers contain six stamens, each of them fastened by its lower part to one of the petals, which are also six in number: the filaments spread out a little, and the anthers are covered by the upper

part of the petals. If any thing, — an insect, for example, in search of honey, — touches the filament near the bottom, it immediately contracts, and strikes its anther against the summit of the pistil; but any other part of the stamen may be touched without producing this effect. In the entire flower, the filament that has contracted, gradually goes back of itself to its original position, and may be made to move as before, several times, without losing this property; and even when the petals fall off, with the stamens that are fixed to them, the filament still retains its power of moving.

The berries of the barberry are so very acid, that birds will not eat them; but we use them boiled with sugar as a sweet-meat. The leaves also are acid, and the bark of the root is used in Poland for dyeing leather of a beautiful yellow colour.

Sorrel, *Ru'mex Aceto'sa*, is in the order *Trigynia* of this class. The Laplanders use it in preparing a kind of whey from rein-deers' milk, which will keep a long time.

EDWARD.

Is this the same kind of Sorrel that we sometimes eat, when we gather it in the fields?

MOTHER.

Yes; and it is also used in salad. In France another species, *Ru'mex scuta'tus*, French sorrel, is cultivated for the table.

I must not omit the American Aloe, which first came into Europe in the year 1561, and is now planted for hedges in Spain, Sicily, and Calabria.

It is a common opinion that this plant blossoms only once in one hundred years; but the time of its flowering depends on the quickness of its growth: so that in hot countries, where it grows fast, it will blossom in a few years, but in colder climates it is much longer before even the stem shoots up. When vigorous, it grows to the height of more than twenty feet. The tallest aloe of which there is any account, was in the King of Prussia's garden, and grew to forty feet. In another, which flowered in Cheshire, in the year 1737, the stem-bud appeared in June, and grew five inches a day for some weeks; the flower-branches were perfected in twelve weeks, and then ceased to grow for a month, while the buds were forming. This plant produced one thousand and fifty flowers; but one that blossomed at Leyden, in 1760, produced more than four thousand.

The Rice-plant, *Oryza*, is in the order *Digynia* of this class; but has the form and structure of the grasses, from which it differs only in the number of the stamens. Linnæus was acquainted with but one species, the *Oryza sativa*; but I believe that others have been since discovered. The common rice, a native of India, is cultivated throughout the

East, where it is of the first importance to the inhabitants as an article of food.

The Indian Reed, *Calamus petræus*, is another plant of the class Hexandria, which also resembles a grass in some respects; but the stems grow to more than a hundred feet in height, and are then at least the thickness of a man's arm. They are used in Cochin-China for making long pikes; and the inner part of the young shoots is eaten by the natives. Another species of *Calamus*, the *ro'tang*, or *ratan*, has very smooth glassy stems, marked with dark spots; and the long spaces between the joints are used for walking-canes: it grows abundantly on both sides of the Straits of Malacca, from whence it is sent into Europe. There is a third species, *Calamus ver'nus*, which is very common in forests in the East Indies; though not thicker than a man's finger, it often extends to the length of more than a hundred feet; and when split into strips, is used for making ropes, seats of chairs, and several articles of furniture.

EDWARD.

How very large the plants in India grow!

MOTHER.

In all hot countries vegetables grow to a great size, and are found in much greater abundance than in cold climates, where they are very diminu-

tive, and few in number. In Spitzbergen botanists have hitherto found only thirty native species; in Lapland, five hundred and thirty-four; in Iceland, five hundred and fifty-three; in Sweden, twelve hundred and ninety-nine; in Brandenburg, two thousand; in Piedmont, two thousand eight hundred; in Jamaica, Madagascar, and the coast of Coromandel, from four to five thousand. The difference of size in going southward from this country begins to be perceived even in Italy, where the millet, a sort of corn, attains the height of four or five yards. In the East Indies there is a plant called the great Fan-palm, *Cor'ypha umbraculif'era*, with leaves more than six yards in breadth, which grow in the form of an umbrella; and a species of *Aristolochia**, that grows on the banks of the river La Madalina, in South America, has flowers of such great size, that they are used by the children in play, for hats. Another species of this genus, *Aristolochia Clemat'itis*, grows wild in our woods and hedges.

The Monkey's Bread-tree, *Adansonia digita'ta*, is found on the banks of the river Senegal in Africa, and has its name from M. Adanson, a French traveller, who resided several years in that country. The stem is not more than twelve or fifteen feet high, but frequently from eighty to ninety feet in circum-

* Class Hexandria, of Withering; but in the twentieth class, Gynandria, of Linnæus.

ference; and the top is crowded with great branches, like trees, which run out from it in all directions, and touch the ground at their extremities; the roots often spreading to more than a hundred feet around. You will not, then, be surprised to hear, that whole families of negroes sometimes live in the hollow trunk of this tree; which is remarkably long-lived, and has been even computed to live more than a thousand years.

Near the equator, too, gigantic climbers are found, which grow to the length of several hundred yards.

EDWARD.

What are Climbers?

MOTHER.

Plants which are unable to support themselves, but take advantage of whatever is near to raise themselves upon, are called by that name; such as the Vine, and Virgin's bower. Many climbers are furnished with tendrils or claspers, with which they take hold of whatever supports them; some of these twist themselves round their prop from left to right, or according to the apparent motion of the sun, as the Honey-suckle and black Bryony; and others, on the contrary, from right to left, as great Bindweed. In some instances, as in the black Bryony, the tendril twists itself a certain number of times one way, and then takes a contrary direction, pro-

bably for the purpose of securing a more certain hold. What are generally supposed to be the roots of the common ivy are in reality tendrils, that grow in the form of small fibres along the stem or branches, on the side next the supporter; insinuating themselves into the very substance of it, if vegetable, and fixing themselves like real roots, or clinging even to naked walls; for they are covered with hairs, that yield a gluey substance, which fastens them to the smoothest surfaces.

EDWARD.

Then Hops, I suppose, are climbers.

MOTHER.

Yes; and the poles are used to encourage their growth, by giving support to the young branches. In countries where wine is made, entire fields are planted with vines, which are supported on poles, just like the hops that you have seen in Kent and Surrey. I am glad that you have asked these questions; and whenever I mention any thing that you do not quite understand, you must not hesitate to say so. And now, while I recollect it, I will tell you the distinctions between the terms Tree, Shrub, Under-shrub, and Herb, which are frequently employed by botanists.

Trees bear flowers for several years in succession, and send up a lofty trunk, divided, at the top, into many branches.

A Shrub is like a small tree; with a woody stem, which lasts many years also, but begins to be divided into branches near the ground.

An Under-shrub is described by Decandolle, a French botanist, as a plant, of whose stems the lower part only is woody; but the upper part, being of an herbaceous nature, dies every year.

Herbs, or Herbaceous plants, have soft, not woody stems. If they bear leaves and seeds within one year and then die, they are called Annuals; when they bear leaves in the first year, and flowers in the second, and then die, they are Biennials; and if they live and flower for more years than two, they are called Perennials.

The Oak, and Horse-Chesnut, are trees; Myrtle and Privet, shrubs; Candy-tuft is an under-shrub; Parsley and Mint are herbs.

Climate and cultivation have great effect upon the growth and duration of all plants; so that the shrubs of cold countries attain, in warmer climates, the size of trees; and, in a few instances, even herbaceous plants become as large as the trees in our orchards. On the contrary, the trees of a warm or temperate climate dwindle into shrubs in a cold one. The colours, too, of the tropical flowers, particularly those of Asia, are much richer and more variegated than in those of cold countries, which are principally white and blue.

EDWARD.

What is the meaning of Tropical ?

MOTHER.

It is a term used in geography, which you will find explained in your books on that subject. — The space that lies between what are called the Tropics is more directly under the influence of the sun, and is much warmer than any other part of the globe. But I intended by Tropical plants only to signify those that grow in the warmest climates of the world.

But I must not omit the *Lilium*, a genus which belongs to the sixth class, and is one of the most important in a very numerous tribe known under the general name of Lilies. The flowers of this genus are very beautiful, being shaped like a bell, and composed of six petals, generally of the most brilliant colours. The roots are round and fleshy Bulbs;—a sort of root of which there are several different kinds; and of which the Crocus and Snow-drop afford good examples. [See PLATES 4. and 8.] In the tulip the bulbous root is solid, hard, and smooth: in the lily it is scaly, something like the skin of a fish, or the cup of a thistle: and in the onion it is coated, which means, composed of layers one over another.

Bulbs are commonly considered, and very often described, as roots; perhaps because they are lodged

entirely in the ground when planted by the gardener; but the true root is, not the bulb, but the fibres that issue from its under surface; and if these are cut away, the bulb will not grow. Linnæus calls the bulb the winter quarters of the future plant, furnished with a root suitable to its peculiar structure.

EDWARD.

Are turnips bulbous roots?

MOTHER.

No; but they are sometimes described as such. What is generally considered as the root of the turnip is only a kind of intermediate stem, that swells into a bulbous form, between the real stem and the root.

The bulbous roots of the Kamschatka Lily, *Lilium camschatcense*, called by the natives Saranne, forms a principal part of the food of the inhabitants of that country: and, happily, the plant is very abundant in Kamschatka; all the grounds there blooming with its flowers during the season. At the periods when fish is scarce, the Saranne is plentiful, and when there is a dearth of this food the rivers supply provision. The roots are gathered by the women, dried in the sun, and laid up for use. After being baked, they are ground to a powder, or flour, of which the best Kamschatkan bread is made; and they are also sometimes eaten like potatoes.

But it is not to the labour of the women alone that the Kamschatkans are indebted for a stock of these roots; a species of mouse saves them a great deal of trouble in procuring it. The Saranne forms part of the winter provision of that little animal, which not only gathers them in the proper season, and lays them up in its magazines, but has the foresight to bring them out to dry in sunny weather to prevent their decaying. The natives search for these hoards; but always take care to leave a part for the mice, to save those useful little creatures from perishing for want of food.

CONVERSATION THE NINTH.

CLASS 7. HEPTAN'DRIA. — TRIENTA'LIS. — HORSE-CHESNUT TREE. — CLASS 8. OCTAN'DRIA. — HEATHS. — DAPH'NE MEZE'REUM, COMMON MEZEREON, EXAMINED. — MAPLE. — NUT-TREE. — WALNUT. — BALM OF GILEAD. — POPLAR. — CORK-TREE. — OAK; ITS VARIOUS USES. — CLASS 9. ENNEAN'DRIA. — BU'TOMUS UMBELLA'TUS, FLOWERING-RUSH, EXAMINED. — LAUREL-TREE. — CINNAMON. — CAMPHOR. — RHUBARB.

MOTHER.

WE are now come to the least numerous of all the classes, the seventh, Heptandria, of which there is but one genus native in England; and of that only one species is known, the Chickweed Wintergreen, *Trienta'lis europæ'a*. It grows in woods, and on turfy heaths in the northern counties, but you are not likely to meet with it in our own neighbourhood.

The Horse-chesnut, *Æs'culus Hippocas'tanum*, in the first order of the class Heptandria, is a native of the northern parts of Asia, from whence it was introduced into Europe, about the year 1500. There are several Horse-chesnut trees in our plant-



Flower opened & magnified

Daphne Mezereum—Common Mezereum.

Class VIII. *OCTANDRIA*—Order *MONOGYNIA*.

Sowerby sc.

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ations, and you know how beautiful the buds and flowers are, in the months of April and May. The tree affords a fine shade while the leaves remain upon it; but as they begin to fall off in July, it soon loses its beauty. Deer are particularly fond of the nuts; which, in Turkey, are ground and mixed with the horses' food; and in England a paste or size is prepared from them, which is preferred by bookbinders and paper-hangers to that made from wheaten flour.

EDWARD.

Is the wood of the Horse-chesnut made any use of?

MOTHER.

None, that I know of, except for water-pipes under-ground; but I have heard that its bark is sometimes used in medicine. The prickly husks of the nuts are used in tanning leather.

In England and all cold climates, trees and shrubs are universally provided with buds; which seem to be intended for the protection of the new parts about to be added to the plant; since the same trees which are furnished with them in our climate do not produce them in hot countries. The bud of the Horse-chesnut is remarkably large and beautiful.

The eighth class, Octandria, contains a very numerous and beautiful genus, that of the Heaths, Eri'ca, which is confined entirely to Europe and the southern parts of Africa. The country about the Cape of Good Hope is, of all others, the most abundant in them; and it is said that the Cape alone produces more than two hundred and fifty species. It is remarkable that no species of this genus has been discovered in New Holland, Asia, or the continent of America; and, what is still more extraordinary, they do not occur between the tropics, although they are found both in the Northern and Southern hemispheres, in corresponding latitudes. The heaths in general are not fragrant, but the Eri'ca o'dor-ro'sea has a scent like otto of roses, and the tenuiflo'ra has the odour of a carnation.

Our native heaths, of which there are five species, though inferior to the foreign ones, are very beautiful. The most common, vulga'ris, is very useful to the poor inhabitants of the north of Scotland, who make beds, and thatch the roofs of their cottages, with it. In England and Ireland brooms are made of its branches; and in the island of Islay, one of the Western Isles, ale is sometimes made of the young tops, with the addition of a little malt. The bee extracts a great deal of honey from the flowers of heath.

Here is a drawing of the Mezereon, [see PLATE 9.] a plant in the order Monogynia of this class; which you must be contented with, for this year, as the plant itself flowers in February and March, and is now out of blow.

EDWARD.

Then you will read a description of it, while I look at the drawing; and next spring we can try to find some real Mezereon in the hedges?

MOTHER.

It is not a very common plant, and I do not think you will find it growing wild in this part of the country; but that in our garden is of the same species; and will do as well for examination. The generic name is Daph'ne, and the characters of the genus are these: — It has no calyx; the blossom is of one petal, shaped like a funnel; the tube of the blossom is longer than the border, which last has four flat divisions, ending in points. There are eight stamens, growing on the inside of the tube, in two rows; four of them below the other four, but placed alternately. The germen is egg-shaped, and contained within the blossom; the style very short. The seed-vessel is a pulpy round berry, which contains a single seed.

Withering mentions two native species; and the character which distinguishes the Meze'reum,

of which the English name is Spurge-Olive, or Mezereon, consists in the flowers being Sessile, or sitting close, without any flower-stalks, and growing upon the sides of the stem, generally three together. The leaves, which are spear-shaped, grow from the ends of the branches, and fall off in the autumn. The berries are red; and Linnæus says they are so poisonous, that six of them will kill a wolf. The mezereon does not produce its flowers till January or February; but if a bud is dissected in the month of August preceding, the petals, the stamens, and all the parts of the young fruit, may be distinctly perceived.

EDWARD.

Is Mezereon a shrub or a tree?

MOTHER.

It is only a shrub, as you may perceive from its throwing out branches so near the ground.

There is another species of *Daph'ne*, the *Laget'to*, called the Lace-bark tree, from the resemblance of its inner bark to net-work or lace. This bark is very beautiful, and consists of several layers that may be easily pulled out into a fine white silky web, three or four feet wide, like lace or gauze, which has often been used for ladies' dresses; and Swartz, a celebrated botanist, says that it may be washed without injury. King Charles the Second is said

to have had a cravat made of this web, presented to him by the governor of Jamaica; of which island, and of Hispaniola, it is a native.

The common Maple, *A'cer campes'tre*, and the Sycamore, or Plane-tree, *A'cer Pseu'do-plat'anus*, are placed by Withering in the same class and order as the Mezereon *, and both are natives of England. The wood of the first species is much used by musical instrument-makers, on account of its lightness; and that of the Sycamore is one of the best that can be employed for turning: — it was in universal use for trenchers before the introduction of earthen-ware. The Sugar-Maple, *A'cer sacchari'num*, grows in great abundance in Pennsylvania, where the inhabitants make sugar in large quantities from the juice or sap, which they obtain by piercing the stem of the tree in spring. The sugar is made nearly in the same manner as that procured from the sugar-cane, of which I have already given you an account.

The Whortle-berry, or Bilberry, *Vaccin'ium Myrti'lus*, and Cranberry, *Vaccin'ium Oxycoc'cus*, are in the first order of this class, and grow plentifully in Scotland and some parts of England. Whortle-berries are the principal food of the moor-game in Scotland; and Cranberries are so

* In the twenty-third class, Polygamia, and order Monoecia, of Linnæus.

much liked for making tarts, that they are brought to London from the northern counties, and even imported from Russia; as are also the berries of another species of *Vaccin'ium*, the *Macrocar'pon*, nearly resembling the European, but with larger fruit, from North America. In China, the *Vaccin'ium formosum* is a sacred plant; the flowers are gathered at the beginning of the Chinese year, and placed in all the temples as an offering.

The Hazel-nut tree, *Cor'yus Avella'na*, in the order *Digynia* of this class, according to *Withering**, grows very commonly in our woods, and its timber is used for several different purposes. I need not describe the nuts to you, for you saw them yesterday at dinner. Squirrels live almost entirely upon them, and the leaves of the trees are eaten by horses.

EDWARD.

What tree is it that produces Walnuts?

MOTHER.

The *Ju'glans re'gia*, which was originally brought from Persia, but now grows commonly in this country. The genus *Ju'glans* is in the class *Monoecia* of *Linnæus*. The tree grows to the height of fifty feet, and bears large green clusters of fruit, inclosing furrowed nuts, which ripen in September and

* Class twenty-one, *Monoecia*, order *Polyandria*, of *Linnæus*.

October : the young fruit is pickled, and when ripe, the kernels are eaten. It is from these nuts that what is called nut-oil is obtained, but the hazel-nut also affords a kind of oil which is used by painters. The wood of the Walnut-tree takes a fine polish, and was formerly much used in furniture : its principal use at present is, for making gun-stocks, for which purpose the king has plantations of the tree in different parts of England.

The *Amyris Gileadensis*, Balm of Gilead, is a shrub in this class and order, which grows in Judea and Arabia, and produces the resin or gum celebrated in Scripture for its medical virtues. It is so highly valued by the Turks, that its exportation is prohibited.

I had almost forgotten to tell you, that the Poplar, of which there are three or four native species, belongs, according to Withering, to the order *Monogynia*, of the eighth class.* The bark of the Aspin-tree, or trembling Poplar, *Populus tremula*, which is one of them, is the principal food of beavers ; and Linnæus says, that it serves as fodder for cows, goats, and sheep, in West Bothnia, a part of Sweden, being cut into very small pieces in autumn, and laid up to dry till the following spring, when it is used instead of hay, which is very scarce there at that season. The wood-

* Class and order *Dioecia Octandria*, of Linnæus.

pecker is very fond of the Aspin-tree, for the bark is so soft that he can easily penetrate it to make his nest; and great numbers of insects are to be found in the decayed wood.

The poplar is the fittest of all trees for raising a shade quickly; it will sometimes grow fourteen feet in a single season. The bark of the black Poplar, *Populus ni'gra*, is so light, that it is sometimes employed instead of cork, to support the nets of fishermen in the water.

EDWARD.

But what is real Cork?

MOTHER.

It is the outer bark of a species of Oak, *Quer'cus Su'ber*, of a genus placed by Withering in the class Octandria *, which grows in the south of Europe and the north of Africa.

The Cork-tree does not begin to be productive until it is fifteen years old, and even then the bark is only fit for fuel, nor does it arrive at perfection till about the twenty-third year; but from that period it continues, for about an hundred and fifty years, to yield good cork every tenth year. The season for stripping off the cork is in July and August, and great care is taken not to wound the inner bark, which in time becomes good cork also.

* Monoecia Polyandria, of Linnæus.



Pistils magnified

Part of a Leaf

Butomus umbellatus — *Flowering Rush.*
Class IX. ENNEANDRIA — Order HEXAGYNIA.

The best sort comes from Spain and Portugal; and is imported in great quantities into England, where it is cut into corks for bottles, and applied to many other purposes. The Spaniards cover the walls of their houses with cork, like wainscotting, which not only makes them warm, but very dry; and the peasantry in Spain lay broad planks of it at their bed-sides, as we do carpets; they also burn it, to make what is called by painters Spanish black. The Egyptians formerly made coffins of cork lined with resin, which preserved their dead bodies for a long time.

Two species of *Quer'cus*, or Oak-tree, grow naturally in England, one of which, the *Quer'cus* *Ro'bur*, is particularly valuable; it is indeed the most important of our native trees. The oak is remarkably long-lived, and attains a great size, the full-grown trees sometimes measuring from fifty to sixty feet round. The wood is hard and tough, takes a good polish, and, when well manufactured, has a very handsome appearance. The roofs and frame-work of almost all our ancient buildings that are the best preserved are formed of this timber; and it is now always employed where strength and durability are required. The crooked branches of the oak are of peculiar value in building ships, and there are extensive forests in England belonging to the King, which are reserved entirely for that purpose. Oak saw-dust is one of the principal vege-

table ingredients used in dyeing the different shades of brown and drab colour. The bark of the tree is universally employed for tanning leather; and the acorns or fruit, which enclose the seed, for fattening deer and pigs. The tree is at least one hundred years attaining its utmost perfection: it continues vigorous for perhaps a hundred more, and then begins to decay. At Calthorpe, near Wetherby, in Yorkshire, there is an oak which measures seventy-eight feet in circumference close to the ground, and forty-eight feet at the height of a yard: It is said to have begun to decline in the reign of Queen Elizabeth, and though at present much decayed, is still likely to stand for many years.

Those light spongy bodies, about the size of walnuts, called oak-apples, which you have often seen, are excrescences that grow from the leaves and other tender parts of this tree, when wounded by insects in depositing their eggs: they are called also galls, and there are several different kinds, occasioned by different insects. Some of them are very useful in dyeing black, and the common gall is an essential ingredient in the ink that we write with. It is extremely bitter and astringent; but the galls of the *Sal'via pomif'era*, Apple-bearing Sage, a plant in the class *Diandria* and order *Monogynia*, are said to be of a very pleasant flavor, and are considered as a great delicacy in eastern countries.

The plants of the ninth class, Enneandria, are so few in number, that I think we can go through them to-day; and I dare say it will give you pleasure to examine this one, which I have just procured for you. [See PLATE 10.]

EDWARD.

How beautiful it is! I long to find out its name.

MOTHER.

That you can easily do; for there are but three native genera in this class, according to Withering, and only one in the arrangement of Linnæus. Here, take the plant in your hand, while I read what Withering says about the genera.

The first genus described, *Mercurialis**, is in the order Digynia; it has no blossom, and the flowers with stamens are on different plants from those with pistils:—we need not read any farther about it, for your plant, having six pistils, is in the order Hexagynia; and it has a blossom with stamens and pistils in each flower.

In the second genus, *Butomus*, the calyx, which is called an *Involucrum*, is composed of three leaves.

* In the class and order Monoecia Enneandria, of Linnæus.

EDWARD.

But these flowers have no calyx.

MOTHER.

It is true that each flower has not a separate calyx: but if you look at the top of the stem, from which the flower-stalks grow, something in the manner of an umbelliferous plant, you will perceive three sharp-pointed brownish leaves, that form a sort of general calyx to the umbel or set of flowers; this is called an Involu'crum, The blossom is round, hollowed out like a bowl, and composed of six petals; three of them smaller than the rest, and standing alternately on the outside between the others. There are nine stamens, the filaments are awl-shaped, and the anthers composed of two flat pieces laid close together; and six pistils, each consisting of a germen, which gradually passes into a style, with a summit slightly notched.

In the next genus of Withering, *Hydrocha'ris**, the stamens and pistils are in the flowers of different plants:—so that *Bu'tomus* must be our genus, of which there is but one species known, called *umbella'tus*, from the resemblance of its sets of flowers to an umbel. The English name is Flow-

* Class and order Dioecia Enneandria, of Linnæus.

ering-Rush, and it grows on the margins of lakes and slow-running rivers.

EDWARD.

I wish we could always have real plants to examine; it is so much more easy to remember them than the drawings.

MOTHER.

So do I, my dear; and I hope we shall succeed in finding some in the classes that we have still to go through; but it is not possible to obtain them all at the same period of the year.

The genus *Laurus*, or Laurel, is in the order Monogynia, of the ninth class; but none of the species grow wild in England.

The sweet Bay-tree, *Laurus nobilis*, is a native of Italy, and is said to be the true laurel of the ancients, with which they crowned their generals when they gained victories. It is a fine aromatic evergreen, and grows to the height of thirty feet.

The Cinnamon-tree, *Laurus Cinnamomum*, is a native of Ceylon, where it grows commonly in the woods and hedges, and is used by the Ceylonese as fuel, and for other domestic purposes. The whole plant is covered with a bark, at first green, and afterwards red: when the tree is three or four years old, this bark is peeled off and cut into

narrow slips, and these, when dried in the sun, curl up into quills or flakes, which are the Cinnamon we see in the shops. That of Ceylon is more highly flavoured than the produce of any other country. The fruit of the tree is shaped like an acorn, but not so large. A kind of pigeon that feeds on this fruit is very useful in propagating the tree in Ceylon; for in carrying it to its young, it often drops it in different places, where it takes root. When the seeds are boiled in water, they yield an oil, that hardens into a white substance, which has a delightful smell, and is made into candles at Ceylon, for the use of the king only.

The *Laurus Camphora*, or Camphor-tree, is so called from its affording what is called Camphor; a white brittle substance, which is so inflammable that it will burn even on the surface of water. This species grows in Japan, and is there a large and valuable timber-tree:—it is used in the best buildings, and for the masts of ships.

Rhubarb, *Rheum*, is an herbaceous plant in the order Trigynia of the Ninth class. The common sort, *Rheum Rhaponiticum*, is a native of Turkey in Asia, but is frequently planted in our gardens; and we use the young leaf-stalks in spring for tarts. The Chinese Rhubarb, *Rheum palmatum*, and another species that grows in Tartary, *Rheum compactum*, have thick, fleshy, yellow roots, which are much used in medicine. The *Rheum palmatum*

is a remarkably quick-growing plant, and the stem has been known to grow upwards of eleven feet in three months; some of the leaves are five feet in their largest extent; and the root, which remains in the ground during the winter, grows also to a very large size. Roots of five years old, produced in this country, have been sometimes found to weigh in their fresh state more than seventy pounds.

We shall leave the Tenth class till to-morrow; for I think you have heard quite enough for the present.

CONVERSATION THE TENTH.

CLASS 10. DECAN'DRIA. — STRAWBERRY-TREE. — SAXIFRAGE. — PINK. — DOUBLE AND SINGLE FLOWERS. — CARNATION. — AGROSTEM'MA GITHA'GO, CORN-COCKLE EXAMINED. — WOOD-SORREL. — LIG'NUM-VITÆ-TREE. — LOGWOOD. — BRAZIL-WOOD. — LOCUST-TREE. — MAHOGANY-TREE.

MOTHER.

THE common strawberry-tree, *Arbutus Une'do*, is one of the species most remarkable for beauty amongst the native plants of the class Decandria: — it belongs to the order Monogynia, and grows wild in Ireland, Italy, and Spain. The time of its flowering is in November or December, but the fruit does not ripen till the following winter; and it is singular to see, at that season, a tree in the open ground covered with both flowers and fruit; for when the fruit is ripe, and still remaining on the tree, the flowers for the succeeding crop are in full bloom.



Agrostemma Githago — *Corn Cockle*.

Class X. *DECANDRIA* — Order *PENTAGYNIA*.

The plants that flower the earliest do not always ripen their fruit the soonest: the Hazel blows in February, but does not ripen its fruit till autumn; while the Cherry, which does not blow till May, is ripe in June. It may be taken, however, as a general rule, that if a plant blows in summer, it ripens its fruit in autumn,—as is the case with the Vine; and if it blows in autumn, the fruit is ripe in the winter: but the Meadow-Saffron, though it blows in the autumn, does not ripen its seeds till the succeeding spring.

EDWARD.

The Ar'butus berries look like strawberries:—I have tasted some of them in the shrubbery, but they were not very good.

MOTHER.

They are insipid; but they are sometimes eaten by the country-people in the south of Ireland, where this tree grows abundantly and in great perfection,—especially among the rocks of the Lakes of Killarney.

The black-berried Strawberry-tree, Ar'butus alpi'na, which grows on mountains in Scotland, flowers in June and July, and bears a fruit that resembles black currants, both in shape and flavour.

The second order, Digynia, of this class, contains the genus *Saxif'raga*, or Saxifrage, of which there are several native species. The London Pride, *Saxif'raga umbro'sa*, is one of them; and although this plant is so common in all our gardens, its natural situation is on high mountains.

The beautiful genus of Pinks, *Dian'thus*, which includes all the varieties of Carnations and Sweet Williams, is also in this order; and there are five or six native species of it. The fine double Carnations, that are so much admired, are only varieties of the common Pink, *Dian'thus Caryophyl'lus*, which in its wild state bears single flowers.

EDWARD.

What are double flowers?

MOTHER.

All flowers, which have a greater number of petals than usual, are commonly called Double;—but, strictly speaking, they should be called double, treble, quadruple, and so on, according to the number of rows of the petals. Great richness of soil, and high cultivation, have such an effect upon plants, that they grow very luxuriantly; and the stamens, in some kinds, are converted into petals. When all the stamens are changed in this way, the flower is called Full, and can no longer produce seeds: and in order to bring back the plant to its natural state, we ought to put it into a poorer soil;—or, in other words, to give it less food, or not of

so rich a quality. Flowers with many petals often become full; but those of one petal are more disposed to be changed into double or treble, &c. which botanists call being multiplied. In either state, they are generally thought to be more beautiful, and are very much valued by gardeners; but a botanist considers every thing as a deformity that is not natural to a plant in its uncultivated state. If I wished to examine the botanical characters of a species of Dian'thus, I should choose a wild specimen with a single flower. —

EDWARD.

But don't you like the double Carnations a great deal better than the single Pinks and Sweet Williams?

MOTHER.

I certainly do admire the wonderful variety and beauty of their colours.— Can you read these lines?

EDWARD.

Where is the labour of the loom
 Can vie with the Carnation's bloom?
 He who can thus adorn a flower,
 That's doom'd to perish in an hour,
 Forbids his creatures to despair
 His universal love to share.

MOTHER.

Here is the plant that I have brought in this morning to examine. [See PLATE 11.] Can you tell me its class and order?

EDWARD.

It must be in the tenth class, Decandria, and the order Pentagynia; for it has ten stamens, and five pistils.

MOTHER.

Very well; now compare it with this description. — Calyx, a cup of one leaf, of a texture something like that of leather, with five sharp divisions; blossom composed of five petals; the lower parts of the petals, which are called Claws, as long as the tube of the cup; border of the blossom spreading out. The filaments are awl-shaped; and the styles of the pistils thread-shaped, as long as the stamens, with undivided summits. This is the generic character of *Agrostem'ma*, and you see it answers very well. — There is but one species native: the specific character consists in the whole plant being hairy; the cup having ten ribs, with divisions reaching beyond the blossom; and the petals being undivided, and without down or hair. The English name of the plant is Corn-Cockle, and the botanical one *Agrostem'ma Githa'go*.

EDWARD.

I think I have seen it in corn-fields.

MOTHER.

I dare say you have, for it grows in abundance amongst corn, where it is a troublesome weed.

EDWARD.

What a thick calyx this flower has, with such delicate petals?

MOTHER.

The use of the calyx is to give security to the other parts of the flower before it opens, and afterwards to support them in their proper places: its figure varies a good deal in different flowers; and it is sometimes altogether wanting;—as in the tulip, which has fleshy and firm petals standing on a broad and firm basis, that need no support. Carnations, on the contrary, whose petals are particularly long and slender at the lower part, and would be apt to break, have a calyx composed of one piece, which is indented at the top, that it may fold over the petals before they expand, and by spreading under them, when the flower is in full blow, support them better. In some flowers, where the petals are very long and slender, the calyx is composed of several pieces, lying over each other like the scales of fishes.

The pretty little Wood-Sorrel, *Oxa'lis Acetosella*, is in the same order with the corn-cockle. The leaves, which are shaped like those of the trefoil, close up on the approach of rain; and when it is dry, they open again, and hang down: they are very acid, like those of the common Sorrel,

Ru'mex Aceto'sa; and a salt is prepared from them, which is sold in the shops under the name of essential salt of lemon.

From the opening and shutting of several flowers, as well as leaves, we may judge of the state of the atmosphere. If the *Son'chus Siber'ica*, Siberian Sow-thistle, shut at night, the following day will probably be fine, but if it remain open it will be cloudy and rainy. If the *Tage'tes erec'ta*, the African Marigold, continues shut in the morning, long after its usual time of opening, rain is nearly approaching; and the *Convol'vulus arven'sis*, small Bindweed, and *Anagal'lis arven'sis*, scarlet Pimpernel, even after they have opened, shut themselves up again on the approach of rain. — From this circumstance, the Pimpernel has obtained the name of the poor man's weather-glass.

EDWARD.

Are there any trees in the Tenth class?

MOTHER.

I do not know of many, and none of them except the *Ar'butus* are native: but I will tell you of a few foreign ones that I recollect.

The *Lig'num-Vi'tæ*-tree, *Guai'acum officina'le*, in the order *Monogynia* of this class, is a native of the West Indies. The wood is so heavy that it sinks in water, and so hard that it breaks the tools

which are employed in cutting it down: it is, therefore, seldom used for common purposes; but is of great use to sugar-planters, for making wheels in their sugar-mills, and is frequently made into bowls, mortars, and other utensils for which very hard wood is necessary.

It is said that the wood, bark, the gum, which is called Gum-guaiacum, the fruit, and even the flowers of this tree, are useful in medicine.

The Logwood-tree, *Hæmatoxylon campechi-
a'num*, which is of the greatest use in dyeing, and in staining wood, is a native of South America. It is very heavy, and is brought to Europe in logs of about a yard long, which are cut and bruised by a mill before they can be used by the dyer.

The Brazil-wood, *Cæsalpi'nia brasiliën'sis*, which is used for similar purposes, particularly for dyeing cloth of a beautiful scarlet colour, comes from the West Indies. The wood is very hard and dry, of a red colour, and takes a good polish.

The Egyptian Cassia, or Senna-tree, *Cassia Senna*, which produces the leaves that are used in medicine, is a native of Persia, Syria, and Arabia. The leaves are gathered in those countries, and sent to Alexandria in Egypt, from whence they are brought to Europe.

The Locust-tree, *Hymené'a Courb'aril*, which grows in the West Indies, produces from its roots a fine transparent resin, called in the shops Gum-

an'ime, which, when dissolved in spirits of wine, makes a very fine varnish. The wood of the tree is remarkably heavy.

The Mahogany-tree is the last I shall mention in this class. Its botanical name is *Swiete'nia Mahog'ani*; and it grows in the warmest parts of America, and some of the West India islands. The seeds, which are very light, are often blown into the chinks of rocks, where they take root, and at length produce trees of considerable size; and the wood of those that spring in this manner, from exposed situations, is harder and better than what grows in other places.

Mahogany is found to answer better than any other timber for cabinet-maker's work, for it takes a fine polish, and is very durable. It was first brought to England about a hundred years ago, by a West India captain, as ballast for his ship; and being found too hard to be cut with the common tools used by carpenters, was laid aside as useless; but afterwards, it is said, the captain's wife being in want of a box to hold her candles, thought that a kind of wood so hard would answer very well for keeping out the mice, and had stronger tools employed to make one. The wood was then found to be so beautiful, that the fame of mahogany became general, and it has ever since been imported in large quantities.

I do not wish to tell you any thing more at pre-



Sempervivum tectorum—Common Houseleek.

Class XI. *DODECANDRIA* — Order *DODECAGYNIA*.

sent, my dear, as it will be better for you to remember well what you have already heard; and if you attempt to learn too much at one time, you can retain nothing in your memory.

To-morrow morning we will go into the village, and look for some Houseleek; which grows on the roofs of cottages, and the tops of old walls. It is the best plant of the eleventh class, that I can think of, for examination; and there is but one native species: but we must try to find some of it growing in different situations, for a reason that I shall tell you when we examine the plant.

CONVERSATION THE ELEVENTH.

CLASS 11. DODECAN'DRIA. — SEMPERVIVUM TECTORUM, COMMON HOUSELEEK, EXAMINED. — DEFECTS OF SYSTEMS. — MIGNONETTE. — CHESNUT-TREE. — BEECH. — CLASS 12. ICOSAN'DRIA. — SITUATION OF THE STAMENS ; ITS IMPORTANCE. — ROSA CANINA, DOG-ROSE, EXAMINED. — ROSES. — SWEET BRIAR. — FRUIT TREES. — HAWTHORN. — THORNS. — CLOVE-TREE. — MYRTLE. — PEACH AND ALMOND TREES. — POMEGRANATE-TREE.

EDWARD.

Are you ready now, mamma, to read a description of the Houseleek?

MOTHER.

Yes, my dear.—But I wish I could have procured a flower that would show the character of the class Dodecandria more distinctly: since the number of stamens varies, under different circumstances, even in the same species of the genera that are native. The Houseleek, however, is certainly placed in this class by botanists. Can you tell me the order it is in?

EDWARD.

I suppose it is Dodecagynia, for I see twelve pistils, and I think you told me that whenever there were about that number in each flower, the order was called so.

MOTHER.

You are right. The number of the pistils in the genus *Sempervi'vum*, to which this plant belongs, is commonly twelve; but it often varies. Here, then, is the description. — [See PLATE 12.] The calyx is a cup, of one piece, with twelve or more sharp divisions: the blossom is longer than the cup, and composed of the same number of sharp petals, each of which is fringed with fine hairs. The number of stamens is in general the same with that of the petals: but frequently, in this species, some of them are imperfect, and of very different appearance from the rest. There are about twelve germens, placed in a circle, which have sharp summits. In our plant, the *Sempervi'vum tecto'rum*, the leaves grow in thick tufts, and are very fleshy, and fringed at the edges with hair.

EDWARD.

Look at this piece that grew upon the wall; it has only eight pistils.

MOTHER.

In the Houseleek you will often find, that the number of all the parts of the flower, especially the pistils, varies according to the richness of the soil in which the plant has grown; and it was for this reason that I wished to bring home specimens from different situations. The branch that we have just examined was from the thatched roof of the cottage, where I suppose the soil was richer than on the top of the wall.

EDWARD.

I am afraid that I should not have been able to find out the name of this plant, if you had not told me.

MOTHER.

It is unsatisfactory to examine the plants which are placed in this class, because the character itself is imperfect. You must always recollect, that every botanical arrangement, or System, as it is called, must be defective, because the acquaintance with plants, even of the best botanists, is very far from being complete. The method of Linnæus is upon the whole the best; but it has some faults;—and the imperfection of this eleventh class is one of them; for it has been formed merely for convenience, and has no foundation in nature; whereas the grasses, and some other tribes of plants that I

have told you of, are very regular in the number and situation of the different parts, upon which the classes and orders are founded, and have besides a natural character that distinguishes them.

The genus *Rese'da*, of which the Mignonette is a species, belongs also to the class Dodecandria; and Linnæus himself says, that there is scarcely any genus whose character it is more difficult to determine,—the number and shape of the parts of the flower varying considerably in different species. There are two of these native in England, the *Rese'da lu'tea*, or wild Reseda, and the *Lute'ola*, Dyer's weed. The latter plant is made great use of in woollen manufactories for dyeing yellow; and it gives the colour also to the yellow paint called Dutch pink. It flowers in July; and Linnæus has observed that the spike of flowers follows the course of the sun,—turning towards the East at sunrise, towards the West as the sun declines, and at midnight pointing to the North.

The garden Mignonette, *Rese'da odora'ta*, which has its name from the delightful odour of the flower, is a native of Egypt; but was introduced into France about the year 1725, and from thence came to England in 1740; it blossoms from June till the beginning of winter, and the flowers when dried retain their scent for several months.

These three species of *Rese'da* are all annuals; but the *odora'ta*, by being cropped off, will continue

to bear flowers from year to year, as if it were a perennial. — Do you recollect what the word Annual means?

EDWARD.

An Annual is a plant that bears leaves and flowers within one year, and then dies.

MOTHER.

Very well. Several plants which are annual in warmer climates become Biennial, or live for two years with us; because the heat of this country is not sufficient to bring them to perfection in one year, and the seeds do not ripen till the second summer. Some that in warm countries are Perennial, which means lasting many years, become annual with us; the root being killed by our severe winters: and some that are perennial in a cold climate become annual when they are transplanted to a warmer, the heat and drought causing the roots to dry away.

But we must return to the eleventh class, and finish it, that we may go on to the twelfth, which is very extensive, and contains several plants that you will be pleased to hear of.

The Chesnut-tree, *Fa'gus casta'nea*, which, according to Withering, is in the order Trigynia, of the class Dodecandria*, is one of the finest of our

* In the class and order Monoecia Polyandria, of Linnæus.



Cup

Berry

Rosa Canina — *Common Dog Rose*.

Class XII. *ICOSANDRIA* — Order *POLYGYNIA*.

native trees, and is remarkably long-lived. In Gloucestershire there is one, which is proved to have stood there ever since the year 1150, and was even then so remarkable, as to be called the great Chesnut of Tortworth: it measures fifty-two feet round, and still continues to bear fruit, though probably not less than a thousand years old.—The largest chesnut trees that are known in the world grow upon Mount *Ætna* in Sicily. The tree is very beautiful, and *Salvator Rosa*, who painted a good deal in the mountains of Calabria, where the chesnut flourishes, very often represents it in his pictures. The nuts form a great part of the food of the common people in the south of Europe, and the wood is very valuable.

The common Beech, *Fa'gus sylvat'ica*, is also a native of England. The old leaves remain on the tree through the winter; and they are often gathered in the autumn by the poor people, for the purpose of making mattrasses, which are much better, and more durable, than those of straw or chaff. The wood soon decays when exposed to the weather; but lasts a long time under water, and is of the greatest value for making carpenter's tools. The nuts, when dried and ground, are said to make a tolerable sort of bread, but they cause giddiness, if eaten raw: the poor people of Silesia use an oil procured from them instead of butter.

Now, Edward, tell me if you recollect how the

twelfth class, Icosandria, is distinguished from the others?

EDWARD.

I believe there are more than twenty stamens in each flower; and if the petals are pulled off, the stamens remain on the receptacle.

MOTHER.

Bring your little drawing of the classes [see PLATE 2.], and see, yourself, whether you are right.

EDWARD.

Oh, I have made a great mistake!—It is in the thirteenth class, Polyandria, that the stamens grow upon the receptacle. In Icosandria they are fastened to the sides of the calyx.

MOTHER.

Here are two plants, — a Dog-rose and a Butter-cup; tell me to what class each of them belongs?

EDWARD.

I have pulled off the calyx of both flowers, and I find that the Rose is in the class Icosandria, and the Butter-cup in Polyandria; for all the stamens of the rose came off along with the calyx, but in the butter-cup they remain on the receptacle.

MOTHER.

Exactly so. This character of the flower in the class Icosandria is very important; as it indicates, almost infallibly, that the pulpy fruit which comes after the flower, is wholesome. No traveller in an unknown wilderness need be afraid to eat the fruit of any plant whose stamens grow upon the calyx; but the other parts should be carefully avoided, for in some species they are poisonous.*

The plant that we shall examine to-day, is a Rose, which belongs to the genus *Ro'sa*, in the order Polygynia; and as there are several native species, I will at once tell you that this is the common Dog-rose, *Ro'sa cani'na*. [See PLATE 13.] The cup in this genus is of one leaf; with five divisions in its border, which are narrow and sharp-pointed. The blossom has five heart-shaped petals, as long as the cup, and fixed to its neck. You recollect, that in this class, the precise number of the stamens is not material; but there are more than twenty. The filaments are short, and fixed to the sides of the calyx. There is no seed-vessel; but the cup itself swells into a berry, which is coloured, generally bright red, when ripe, and contains numerous oblong seeds rough with stiff hair. It is this cup which forms the principal distinction of the genus *Ro'sa*: in shape it is something like a boy's top,

* Smith's Introduction to Botany, 5th edition, p. 517.

bulging below and drawn in at the neck or upper part, as if confined by a string; and it opens at top to let out the ripe seeds.

The species *canina* is distinguished from the others, by having oblong fruit; the stalks that bear the flowers smooth, but those which support the leaves prickly: and crooked prickles, placed alternately on opposite sides of the stem; two in every joint between the knots. In the calyx, two of the divisions have teeth on both edges; two have none; and the fifth has teeth on one edge only.

EDWARD.

How pretty Dog-roses are! I often wish to bring some home; but the thorns are so sharp, that I can hardly pull them in the hedges.

MOTHER.

They are always accompanied by thorns, and these lines were written to reconcile us to them:—

Why does the painful thorn presume,
To spoil the Rose's soft perfume?—
It was by Providence intended,
Our pains and pleasures should be blended;
We smile to-day, to-morrow mourn,
Nor find a rose without a thorn.

The Sweet-briar, or Eglantine, *Rosa rubiginosa*, is another species of rose, which is common in England: its flowers sometimes grow double, and, as

well as the leaves, have a very delightful scent. The Provins, and Damask roses, provincia'lis and damasce'na, are the most fragrant of the genus Ro'sa. There are two varieties of the Damask, which blossom more than once a year; one called the Monthly rose, the other the rose of Paestum, which has been celebrated by Latin poets for blossoming twice a year. The Moss rose, Ro'sa musco'sa, has its name from the substance like moss, with which the flower-stems and calyx are covered; it is, in fact, a collection of glands, containing a resinous and fragrant fluid.

The Rose is the favourite plant in every country where it is found; but it is remarkable that no roses have ever been met with in the southern hemisphere. Among the ancients, particularly the Egyptians, roses were considered as symbols of silence, for which reason, the goddess Isis, and her son Harpocrates, who was the god of silence, were crowned with chaplets of these flowers. Red and white roses are remarkable in English history as emblems of the houses of York and Lancaster; for when those families were contending for the crown, in the reign of Henry the Sixth, the white rose distinguished the partizans of the house of York, and the red those of Lancaster.

There is another genus in this class, and of the same order, the Bramble, Ru'bus, that in some

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There is another genus in this class, and of the same order, the Bramble, Ru'bus, that in some

respects resembles the rose tribe. Most of the species grow in cool climates or mountainous situations, and are valuable for their fruit, which is wholesome and agreeable. The berry is composed of a number of juicy grains, — in general so strongly attached to each other that they cannot be separated without tearing; and these are collected into a head that is hollow underneath, and placed upon a spongy conical receptacle.

The wild Raspberry, *Ru'bus Idæ'us*, is plentiful in the north of England, Scotland, and Wales, and though smaller than what is cultivated in gardens, which is a variety of the same species, the fruit has a much sweeter flavour. The fresh leaves are the favourite food of kids. The Blackberry, which is so common in all our hedges, is the *Ru'bus frutico'sus*.

The Cloudberry, *Ru'bus Chamæmo'rus*, has its English name from growing on the tops of very high mountains, which are often covered by clouds. It grows plentifully in the north of England and Scotland, and in many parts of the north of Europe. The Norwegians pack up the berries in wooden vessels, and send them to Stockholm, where they are sold for desserts; and the Laplanders bury them under the snow to preserve them from one year to another.

The dwarf Crimson-Bramble, *Ru'bus arc'ticus*, is so diminutive, that an entire tree, with all its

branches, leaves, and fruit, has been placed within a phial capable of holding only six ounces.*

The Plum, *Pru'nus*; the Medlar, *Mes'pilus*; and the Pear and Apple-trees, *Py'rus*, all belong to this class, and are all found wild in England.

The Cherry and Apricot, as well as the Plum, are different species of the genus *Pru'nus*; and though the fruit is so good, the leaves of several of the species are poisonous; especially those of the *Pru'nus Laurocer'asus*, or Laurel cherry. Most species of plum are covered with a substance called the Bloom, which is sprinkled over the surface of the fruit, and very often tinged with a shade of delicate blue; it is easily rubbed off with the finger, but resists the most violent rains.

The *Pru'nus Armeni'aca*, or Apricot, has its specific name from having been originally a native of Armenia; it was first brought to this country about two hundred and fifty years ago.

The Sloe-tree, *Pru'nus spino'sa*, in its natural state, is almost covered with thorns; indeed most species of our fruit-trees, in their wild state, are furnished with thorns; but cultivation soon causes them to disappear, or greatly diminishes their number. Thorns are, in fact, buds, which a sufficient supply of food converts into branches and leaves, but

* Clarke's Travels, Vol. V.

whose growth is checked for want of nourishment. In temperate climates few vegetables are furnished with thorns; while in hot countries they render some of the forests quite impenetrable. In some species of *Mimo'sa*, the thorns are so strong and thick set, as to form a complete defence even against the attacks of animals, except such as have very thick and hard skins, like the rhinoceros, whose skin is said even to resist a musket-shot.

Some plants are furnished with Prickles, which are sometimes so stiff and sharp-pointed that they might be mistaken for thorns; but there is this difference, that the prickle originates in the outer bark, and may be peeled off along with it, while the thorn springs from the wood itself, and remains after the bark is taken away. What we commonly call thorns in the rose-bush are only prickles. Grew remarks, that "thorns being part of the wood which has a tendency to grow upwards, generally point upwards; but prickles, which proceed from the bark only, are in most cases pointed downwards."*

All the varieties of pears and apples belong to two species only of *Py'rus*. The wood of the pear-tree, *Py'rus commu'nis*, is light and smooth, and much used for making carved work: and when stained it serves to make the black keys of piano-

* Grew's Anatomy of Plants, p. 54.

fortes, and black picture-frames. The juice of the fruit fermented, is called Perry; which is made in large quantities in England, particularly in Worcestershire and Herefordshire.

The wild Apple, or Crab-tree, *Py'rus Ma'lus*, though so harsh and disagreeable, is the original from which all our varieties of apples have been produced. The tree lives a long time; and the wood is much used by millwrights. The juice of the wild fruit, which is extremely sour, is called Verjuice, but that of the cultivated kinds, when fermented, makes cyder.

The Strawberry, *Fraga'ria*, is another valuable genus of this class, and grows wild in England.

EDWARD.

Are the large strawberries in our garden of the same genus as the little ones, that we find in the woods?

MOTHER.

They are; and even the species is the same, *Fraga'ria ves'ca*; but the fruit is enlarged, to the size that you see in the garden, by cultivation and richness of soil; which, you remember, I have told you render the growth of almost all plants more luxuriant.

The Hawthorn, *Crataë'gus Oxyacan'tha*, which grows in almost every hedge, and the Mountain-

ash, *Sorbus aucuparia*, that is so ornamental in shrubberies, are in the orders Digynia and Trigynia, of the class Icosandria.

Amongst the foreign genera of this class, the Clove-tree, the Myrtle, and the Peach and Almond-trees are remarkable.

The Clove-tree, *Eugenia caryophyllata*, belongs to the order Monogynia, and is a native of the Molucca islands. Its general appearance resembles that of a laurel. The flowers, which are produced at the ends of the branches in great numbers, are first white, then green, and at last red and hard, in which state they are cloves. The season for gathering this spice is from October to February, when large cloths are spread under the trees to receive the flowers, which are beaten off the boughs with long reeds: as they dry they become yellow; and when gathered for some time, they are of a deep brown colour, such as we see.

The common Myrtle, the pretty evergreen shrub that is to be found in almost every green-house, is the species *communis*, of the genus *Myrtus*; and is a native of Asia, Africa, and the southern parts of Europe. Lord Anson mentions, in his Voyage round the World, that the largest trees that could be procured for timber on the island of Juan Fernandez, and from which he obtained beams of forty feet in length, were of this genus.

The Peach-tree, *Amygdalus Per'sica*, of which there are two varieties, — the Peach with downy, and the Nectarine with smooth fruit, — is in the first order of this class. Its native country is not known, but it is supposed to have come originally from Persia. The Almond-tree, another species, *Amygdalus commu'nis*, is a native of Barberry.

In the same order of this class are the Pomegranate-tree, *Pu'nica Grana'tum*, which bears the fruit supposed to have been the golden apple of the ancients; — and the Eucalyp'tus, a genus peculiar to Australia, of which nearly a hundred species have been already observed, most of them trees of very large dimensions. The Eucalyp'tus glob'ulus, and another species peculiar to the south end of Van Dieman's Island, frequently attain the height of a hundred and fifty feet, and measure, near the base, from twenty to five-and-forty feet in circumference.

CONVERSATION THE TWELFTH.

CLASS 13. POLYAN'DRIA. — PAPA'VER RHÆ'AS, COMMON POPPY, EXAMINED. — SEEDS. — OPIUM. — TEA-TREE. — CAPER-BUSH. — WATER-LILY. — SACRED BEAN OF INDIA. — TULIP-TREE. — SIDE-SADDLE FLOWER. — ANOTTA. — STORY OF AN INDIAN WOMAN.

EDWARD.

I HAVE brought in some beautiful Poppies from the corn-fields; and I am sure they are in the thirteenth class, Polyandria, for all the stamens are fixed to the receptacles, and there are more than twenty of them. Will you read the description of the poppy for me?

MOTHER.

I will, my dear, with pleasure. It gives me great satisfaction to find that you begin to distinguish the classes by yourself. But we must go on regularly: — is there nothing else to be determined before we come to the genus?

EDWARD.

Oh, yes;—the order. Well, there is only one pistil, so it is Monogynia.

MOTHER.

Very well. The genera of this order are, for convenience, divided into three sets, consisting of plants, which have flowers with four petals, or with five, or with a greater number. This plant has but four; and in that division there are only three genera, to one of which of course the poppy belongs.

The seed-vessel of the first genus, *Chelido'nium*, is a long pod, something like that of the wall-flower. [See PLATE 1.] Is that the case in your plant? — Look at the largest of the seed-vessels, [PLATE 14.] and tell me.

EDWARD.

No, mamma; this has a round smooth seed-vessel, with a little thing like a coach-wheel on the top.

MOTHER.

Then it is not *Chelido'nium*. — In the next genus that has four petals, *Actæ'a*, the seed-vessel is a berry, consisting of a pulpy substance, with the seeds dispersed through it, — like a currant or gooseberry, but quite unlike this one. Our plant then must be a *Papa'ver*; and we will now try

whether your flower agrees with the full description of that genus. [See PLATE 14.]

The cup consists of two egg-shaped leaves.

EDWARD.

But these flowers have no cup.

MOTHER.

You must look at some of them that are not fully blown, for the calyx falls off as soon as the blossom opens. When this is the case, the calyx is said to be *Cadu'cous*; if it falls with the other parts of the flower, it is called *Decid'uous*, as in the *Wall-flower*; if it remains after the other parts of the blossom fall, it is said to be *Permanent*, as in the *Corn-cockle*.

The cup consists of two egg-shaped leaves, notched at the ends. The blossom is composed of four round flat petals, large and spreading out, and narrowest at the end next to the receptacle. The filaments are numerous, like hair, and much shorter than the blossom; and the anthers are oblong and flattened. In the pistil the germen is large, and, in general, nearly round, like a globe; — but in some of the species it is oblong, as in this instance; there is no style; and the summit is shaped like a target, or something like a saucer turned upside down, flat, and divided into rays like the spokes of a wheel. The seed-vessel is called a *Capsule*, and is

of one cell, divided half-way through by little partitions that run from top to bottom; and the large flat summit forms a sort of crown upon the top of the seed-vessel, which, when the seeds are ripe, opens in several places close under the crown, to let them out. The seeds are round and numerous.

EDWARD.

What is a Cell?

MOTHER.

It is a hollow space in the seed-vessel, for holding the seeds. A capsule is composed either of one such hollow, or of several; and these cells are sometimes provided with little partitions, to which the seeds are fixed until they are quite ripe and fit for sowing. Can you find the seeds of your poppy?

EDWARD.

Yes; but they are very small. Would every one of these little things grow into a plant, if I were to put them into the ground?

MOTHER.

It is probable that a good many of them would be destroyed by damp, or eaten by insects; which is, perhaps, one of the reasons why they are so numerous.

The number of seeds produced by some annuals is very astonishing: more than thirty thousand have been found in a single head of poppy; and in some other plants the number is still greater. In the great Cat's Tail, *Typha major*, the seeds are blown off by the wind, and no doubt many of them lost; but the evil of this effect is provided against by their vast number, each spike generally bearing above forty thousand seeds! so that upon three spikes, which each plant commonly produces, there are every year more than a hundred and twenty thousand seeds. The Tobacco, *Nicotiana Tabacum*, of a genus in the class Pentandria, has been known to produce, on one plant, three hundred and sixty thousand seeds; and the annual produce of a single stalk of Spleenwort, a kind of Fern, has been estimated at a million.

EDWARD.

And do all plants produce seeds?

MOTHER.

All annual and most perennial plants do, when they grow in a favourable soil and situation.

The structure of seeds, and the manner in which they grow, or germinate, are of great importance in botany;—because they are found to be attended with very great differences, both in the inward

structure and in the outward form and appearance of the plants that arise from the seed. But as the subject is difficult, I shall only give you an account of some of the principal parts into which seeds are divided, and these are, chiefly, the Skin or Husk, the Cotyl'edon, and the Embryo.

The Skin or Husk is only a case by which the parts within are defended from injury; it is commonly of a deeper colour than the parts which it contains.

The Lobes, or Cotyl'edons, immediately surround the embryo or future little plant: and when the stem has begun to grow, they generally appear upon the surface along with it, in the form of the first leaf or leaves: when there is only one lobe, the plant is said to be Monocotyle'donous; when more than two, it is called Dicotyle'donous, which is by far the most numerous division; other seeds have a greater number of Cotyl'edons than two; and some have none at all.

The Embryo is the future plant in miniature, and is in general exceedingly small. — Linnæus calls it the Cor'culum, or little heart. It is the part which all the rest of the seed is intended to nourish and protect, and is itself divided into two distinct parts; one called the Plu'mula, which always grows upwards, and becomes the stem and branches of the future plant; the other, or Radicle, becomes the root, and grows down into the earth. These parts may be

readily distinguished in the common garden bean, the skin of which it is very easy to separate: the two flat portions, which form the greater part of the bean, being the Cotyl'edons, with the little plant or Cor'culum between them.

EDWARD.

Must the seeds be quite ripe, before they can grow?

MOTHER.

Seeds very seldom grow that are not quite ripe, but there are a few exceptions. Peas have been known to germinate even when put into the earth in a green and soft state; and a lemon-seed has been observed to shoot out a little radicle and plumula, even before it was taken from the fruit.

Some kinds of seeds take a much longer time to germinate than others; those of the grasses are among the number whose seeds grow the quickest; and the plants of the rose-tribe are perhaps the slowest.

EDWARD.

But when the seeds are not gathered when they are ripe, what becomes of them?

MOTHER.

Nature takes various methods to ensure their being sown. The seeds of several plants, as of

the A'rum, which grow best in one peculiar sort of soil, are heavy and small enough to fall directly into the ground, when the seed-vessel opens; so as to grow without further care, in the same place where the parent plant flourished. If the seeds are large and light, so as to be borne by the wind, they are often furnished with little hooks, to prevent their straying too far, till they are safely lodged in the earth. Some, on the contrary, have little wings, that when they are ripe, they may be carried by the wind to some distance, lest by falling all together they should come up so thick as to injure each other: the ash and maple are furnished with seeds of this description. Other seeds are scattered, not by flying about, but by being spurted or flung away by the plant itself; those of the wood-sorrel, for instance, which has a running root, are thrown off in this manner; the seed-vessel being of such a construction, that as soon as it begins to dry, it bursts open on one side, and in a moment is violently turned inside out, so that the seeds are scattered to a great distance. When oats are ripe they are thrown from the calyx with such violence, that in passing through a field in a fine dry day, you may hear a crackling noise.

Birds and animals also are sometimes the means of dispersing the seed, when the seed-vessel forms part of their food. This is the case with such fruits as the cherry, sloe, and haw, which birds carry

away, till they meet with some convenient place for devouring the pulpy seed-vessel, and then drop the stone, which contains the seed, into the ground.

Where the seed is liable to be totally destroyed, provision is made for the propagation of the plant by other contrivances. Thus in the strawberry, the seeds of which are eaten along with the pulp of the fruit, and often devoured by vermin, the plant is easily increased by suckers, or young shoots, somewhat in the same manner as the stoloniferous grasses which I described to you the other day.

EDWARD.

Shall we try now to find out what species of Poppy this is?

MOTHER.

There are six or seven native species of *Papa'ver*; two of which, *du'bium* and *Rhœ'as*, resemble each other in their general appearance, and are equally common. As yours is one of these, I will read the characters of both, and you may decide for yourself.

In the species *du'bium*, the capsules are smooth and oblong, that is, of an oval shape, or somewhat like an egg; the stem bears several flowers; and the stalks are covered with a bristly sort of hair, which lies close down upon them.

In the other species the capsules are smooth, and shaped like an urn, broader at the top than at the bottom; the stem bears several flowers, and is hairy, and the hair on the fruit-stalks, instead of lying close down, spreads or stands out.

EDWARD.

I did not know that poppies had any fruit; but you speak of their fruit-stalks. What are they?

MOTHER.

In all plants, the part that contains the seeds is called the fruit, whether it is fit to be eaten or not; and the fruit-stalks are those which support this part. Now, can you tell me, which of the descriptions that I have just read suits your poppy?

EDWARD.

I think it is the last; because the seed-vessel is broader at the top than at the bottom, and the hairs stand out from the fruit-stalks.

MOTHER.

Very right; our plant is of the last species that I have mentioned, *Papa'ver Rhœ'as*, the common red Poppy; and it is one of the most troublesome weeds the farmer meets with among his corn, for it is more difficult to destroy than any other. The seeds will lie a great length of time without shoot-

ing in unploughed land; but as soon as the corn begins to grow they spring up.

When the Poppy is only in bud the stem is curved, and the head hangs down, so as to prevent the rain and dew from getting in; but when the flower has become larger, and is ready to open, the stalk stands up, as if for the purpose of presenting the flower to the influence of the sun's rays.

Opium, that is so much used in medicine, on account of its power to relieve pain, and to occasion sleep, is the juice obtained from the unripe seed-vessels of another species of *Papáver*, the *somniferum*, or white Poppy. In many parts of Asia Minor the inhabitants chew opium, as the sailors and common people chew tobacco in England; and whole fields are sown with the seeds of this plant, just as ours are with corn. When the heads are nearly ripe, they are wounded on one side with a sharp instrument, and a white liquor flows out, which the heat of the sun hardens upon them; this is the Opium; it is collected the next day, when fresh wounds are made on the opposite side of the seed-vessel; but what comes from the first wound is greatly superior to that obtained from the second. After the opium is collected, it is moistened with a small quantity of water or honey, and worked upon a board until it becomes of the consistence of pitch, when it is formed into cakes or rolls for sale. Tincture of opium, which is made by dissolving it in spirit of wine, is called *Laudanum*.

There is another plant, called yellow Horned Poppy, which is in the same order of this class, but of a different genus, *Chelidonium Glau'cium*. It is found in many parts of England near the sea; and has its English name from the great length of the pods, which may be compared to horns. It is a very poisonous plant, which is the case with most of those belonging to the class Polyandria.

EDWARD.

Then, mamma, are there no fruits in this class fit to eat?

MOTHER.

There are a few; but none of them are natives of this country. But there is one tree belonging to it which is very remarkable, and is considered as almost a necessary of life in several parts of the world, as well as in England, though it does not produce an eatable fruit. The Tea-tree, *The'a*, Polyandria Monogynia, is a native of China, Japan, and Tonquin, and has never been found growing wild in any other country. It attains the height of ten or twelve feet, and is an evergreen. The leaves, which are the only valuable part, are about an inch and a half long, and resemble those of sweetbriar; the flowers are something like the wild white rose; and the seeds are round, blackish, and about the size of a large pea. Linnæus says, that there are two species of this plant, the *Bohe'a*, or

black, and the vir'idis, or green tea. The green, which has much longer leaves than the black, is a more hardy plant, and, with very little protection, bears the severity of our winters.

As tea is a most important article of commerce to the Chinese, they bestow the greatest possible care upon its cultivation. It is propagated by seeds, which are put into holes about five inches deep, at regular distances from each other; from six to twelve being sown together, as it is supposed that only a small number grow.

When the tree is three years old, the leaves are fit to be gathered; and the men who collect them wear gloves, that the flavour may not be injured. They do not pull them by handfuls, but pick them off one by one, taking great care not to break any: and although this appears to be a very tedious process, each person gathers from ten to fifteen pounds a day.

The fresh leaves are first exposed to the steam of boiling water, after which they are put on plates of copper, and held over a fire until they become dry and shrivelled; they are then taken off the plates with a shovel, and spread upon mats; some of the labourers taking a small quantity at a time, which they roll in their hands, always in the same direction; while others are continually employed in stirring the tea-leaves on the mats, that they may cool the sooner, and retain their shrivelled appear-

ance; and this process is repeated several times before the tea is fit for use.

The tea leaves are collected at three different seasons. What are first procured, while they are very young, are called imperial tea, which is generally reserved for the court and people of rank, because it is considered as of the finest quality. The last gathering, when the leaves have attained their full growth, is the coarsest tea of all, and is used by the common people.

In China and Japan, tea is sold in every town, and on all the public roads, as beer is in England; and is drunk in the same manner by labourers and travellers: it is used without cream or sugar; and in Chinese drawings, the people are seldom represented at work of any kind without a tea-pot and tea-cup. The people of rank in those countries take as much pains to procure tea of excellent quality as the Europeans do to obtain good wine; and they generally keep it a year before they make use of it.

The Tea tree is said to grow in China, principally in a mild and temperate climate, in the country about Nankin; in Japan, that which is most esteemed grows in the neighbourhood of a small town called Udis; where there is a celebrated mountain of that name, near the sea, the whole of which is planted with tea for the Emperor's use;

and which is entirely surrounded with a wide ditch for its protection.

Tea was first brought to Europe from China, by the Dutch merchants, about the year 1641.

The Caper bush, *Cap'paris spino'sa*, Polyandria Monogynia, grows wild in the Levant. It is as common there as the bramble is with us, growing out of old walls, the chinks of rocks, and amongst rubbish; and is cultivated in the south of Europe, for the sake of the young flower-buds, which are pickled and exported in considerable quantities, and are used at table in England. It is a very beautiful shrub.

But I must return to our native plants, some of which, of this class, are too remarkable to be passed over; particularly the Water-lily, which is equal in beauty to almost any foreign flower.

EDWARD.

I have seen a white Water-lily growing in our ponds. What is its botanical name?

MOTHER.

Nymphæ'a al'ba, of a genus in the order Monogynia. You must watch it in the evening, when the flowers close and lie down upon the water: at night they sink below the surface; and in the middle of the day, when the weather is bright and hot, they rise some inches above it, and expand. The yellow Water-lily, *Nymphæ'a lu'tea*, is also a

very beautiful flower, though much smaller; it grows in the same situations as the white, in ponds and slow-running rivers.

Nymphæa Nelum'bo, the Sacred Bean of India, is celebrated by the Chinese poets. The flowers, which resemble tulips, are composed of numerous petals, tinged with a delicate pink, and are very splendid. The seed is like a small acorn without its cup; it is eaten green, and often preserved as a sweet-meat; the root also is used as food.

The Egyptian Lotus, or Lily of the Nile, is another species, the *Nymphæa Lo'tus*.

The common Lime or Linden tree, *Til'ia europæ'a*, *Polyandria Monogynia*, is a native of England. The wood is preferred by carvers to every other, on account of its delicate colour, and of its not being liable to split or to be injured by worms. The beautiful festoons of fruit and flowers at Windsor Castle, and some of the ornaments of the choir of St. Paul's church in London, which were carved by Gibbons in the time of Charles the Second, are of this wood, and are still in perfect preservation. The leaves of the Lime-tree are dried as winter-food for sheep and goats; and the bark is sometimes made into ropes and fishing-nets. Sugar is prepared in some countries from the sap; and the flowers, which are delightfully fragrant, particularly at night, are eagerly sought after by bees.

There is a tree in the order Polygynia of this class, a native of North America, which bears a flower very much resembling our garden tulip, and is therefore called the Tulip-tree, *Lirioden'dron Tulipif'era*. It grows to the height of seventy or eighty feet, and its wood is used for all sorts of carpenters' work. The flowers, which have six petals, spotted with green, red, white, and yellow, are succeeded by large cones or seed-vessels, but these never ripen in England.

The *Sarrac'nia*, Side-saddle Flower, is of singular structure, both in the flower and the leaves; the plant is very common in the swamps in North America, but is extremely difficult to cultivate in this country. The singularity of the flower consists chiefly in the stigma, which is spread over the stamens like an umbrella. The leaves are hollow tubes, capable of holding water; and it is said, that, in dry weather, birds and other animals repair to them for drink.

I forgot to mention to you, when we were speaking of the first order of this class, that the dye, called Anotta, is obtained from the berries of a tree belonging to it, called *Bix'a Orella'na*, a native of the East and West Indies. The Mexicans employed the anotta, which affords a bright orange colour, in staining wood and in drawing; and it is used in England to give a deep colour to cheese. The bark makes good ropes for common purposes;

and the wood is much used by the American Indians for procuring fire, which they do by rubbing pieces of it together.

EDWARD.

You promised once to tell me a story of a poor Indian woman, who suffered a great deal because she did not know this way of making a fire.

MOTHER.

I did so ; and as we have finished our thirteenth class, you shall hear it now, though it has no immediate relation to Botany ; for it shows the value of knowledge and ingenuity in time of distress. I read the account in Hearne's Journey to the Northern Ocean.

When some of Hearne's companions were hunting in one of the wildest parts of North America, they observed the track of a strange snow-shoe.

EDWARD.

Is that different from a common shoe ?

MOTHER.

It is made of an oblong wooden rim, with cords woven like a net, from side to side, something like the rackets with which you play, but much longer and wider than the foot ; it is fastened to the soles of the feet, and is used to prevent the person who wears it from sinking in the soft snow.

The party followed the track, and came at last to a little hut, where they discovered a young woman sitting alone. They soon found that she understood their language, and was one of a western tribe of Indians, who, with some others, had been taken prisoners by another tribe. The savages, according to their custom, surprised her party in the night; and her father, mother, husband, and even her young child, who was only five months old, were put to death. This act of cruelty gave her such an abhorrence to those Indians, although she herself was treated with great kindness, that she resolved to leave them, if possible, and to return to her own country, at the hazard of the greatest misery and danger:—and she succeeded in escaping; but the windings of the rivers and lakes were so numerous, that she lost her way, and was obliged, with her own hands, to build the hut in which she was found, to give her shelter during the winter.

From her account of the number of moons that had passed since her escape, for that was her way of reckoning time, it appeared that she had been near seven months without seeing a human face; but during all that time she had supported herself very well, by snaring partridges, rabbits, and squirrels.

The methods practised by this poor creature to procure a subsistence were truly admirable. Five

or six inches of an iron hoop, made into a sort of knife, and the iron head of an arrow, which served her as an awl, were the only tools she had; but with these she had contrived to make herself complete snow-shoes, and many other useful articles. When the few deer's sinews that she had taken with her were all used, in making snares for game, and sewing her clothes, she had nothing to supply their place but the sinews of the rabbits' legs and feet; but she twisted these together with great dexterity into threads; and the wild animals that she caught not only supplied her with food, but with a suit of warm clothing for the winter, which she had made of their skins.

It would scarcely be imagined, that a person in her forlorn situation could be so composed as to contrive or execute any thing that was not absolutely necessary to existence; but all her clothes, besides being calculated for real service, showed great taste, and even variety of ornament.

Her hours of leisure from hunting had been employed in twisting the inner bark or rind of willows into small lines like twine, of which she had prepared several hundred yards; and of this she intended, as the spring advanced, to have made a fishing-net, after the manner of her country.

One of her greatest difficulties was to make a fire; — since she had no other instruments for that purpose than two hard stones; but by rubbing or strik-

ing these together, after a great many attempts, she obtained a few sparks, and at last succeeded in kindling some touchwood.

EDWARD.

Is that the wood of the Anotta tree, that you told me of?

MOTHER.

No; — touchwood is not the produce of any particular tree; but dry decayed wood, of almost any kind, which is used in England to catch the sparks struck from steel or iron by a flint. — When I rub this metal button very quickly on the cover of the table, you perceive that it becomes hot; and if I could rub it hard enough, it might even be made to set fire to the cloth. The same effect is actually produced when a piece of steel is struck against a flint; for the scraping or rubbing causes so great a heat, as to set fire to the little morsel of steel which is struck off by the violent blow. — I suppose the poor woman knew that sparks could be struck out from two hard stones; and that she found, by good fortune, some pieces of decayed wood, fit to be set on fire by them; but as this method was very laborious and uncertain, she thought it best to keep her fire burning, with great anxiety, through the whole winter.

CONVERSATION THE THIRTEENTH.

CLASS 14. DIDYNA'MIA. — NATURAL ORDERS. — GLECHO'MA HEDERA'CEA, GROUND IVY, EXAMINED. — LEAVES. — OTHER PLANTS OF THIS CLASS. — HONEY FLOWER. — FOREIGN TREES. — SITUATION AND DISTRIBUTION OF PLANTS. — EFFECTS OF CLIMATE, — AND OF LIGHT.



MOTHER.

I HAVE already told you, Edward, that the flowers of the fourteenth class, Didynamia, contain four stamens, two of which are long and two short. But, besides these distinctions, this class is known by some others, which it is important to attend to, that form what is called a natural character.

EDWARD.

What does that mean?

MOTHER.

Some plants, although belonging to different genera, bear so strong a resemblance to each other,

in their whole structure and appearance, that botanists have been enabled to arrange them into sets or groups, which they call Natural Orders: and the circumstances that distinguish these, are called the Natural character; because they form distinctions which nature itself seems to point out. Whereas the classes and orders that depend upon the number of the stamens and pistils, though they afford a very convenient method of finding out the names of plants, must be called artificial; for they sometimes separate plants that are in reality very like each other. — The umbelliferous plants, for example, have a very obvious natural character. The lilies, too, of which the orange and white lilies in the garden are good examples, form a very distinct natural family; and may easily be known from other tribes, by their bulbous roots, long slender leaves, and handsome flowers, and by having either no calyx, or instead of one a sheath.

EDWARD.

But the hyacinth and tulip are very like what you describe, as well as the lilies.

MOTHER.

So they are; and from this general resemblance, they are placed in the same natural order, and the whole together are called Lilia'ceous plants.

The Grasses form another natural tribe, which



Glechóma hederácea - *Ground Ivy*.

Class XIV. *DIDYNAMIA* - Order *GYMNOSPERMLA*.

includes all plants that have a straight hollow stem, without branches, and commonly jointed; — a single undivided leaf, part of which surrounds the stem like a sheath, growing from each joint; and each flower bearing but one seed. Plants which have these characters, whatever be the class in which Linnæus has placed them, belong to the natural order of grasses, called in Latin Gramína. The different species of rush, and the rice plant, though placed in the sixth class of Linnæus, because they have six stamens, belong to this natural order, as well as the various kinds of corn and the sugarcane, which have only three; and this separation of genera that are so much alike, is one of the principal defects of the Linnæan system.

EDWARD.

But is there no arrangement better than Linnæus's?

MOTHER.

Several different systems or arrangements of plants have been invented by other botanists; which are founded, some upon the fruit, some upon the corolla, and others upon the general appearance of the whole plant, without regard to the number of stamens and pistils. There is not any one quite free from objections; but the ingenuity of some of them will interest and delight you very much, when

you are sufficiently acquainted with the structure of plants to understand them.

My reasons for having chosen the system of Linnæus, in preference to any other, were, that it is almost universally understood and used in England; and that it will enable you to find out the genera and species of plants with greater ease and certainty than any other, which is all that I propose to instruct you in at present. Natural orders, in short, serve best to teach the structure of plants; and Artificial ones to distinguish one plant from another. Linnæus himself, indeed, allows, in his *Gen'era Plantarum*, that his artificial method is of use only to ascertain plants.

EDWARD.

But have not a great many plants been found since Linnæus's time?

MOTHER.

Botanists are constantly discovering new species; and travellers seldom visit distant countries, without bringing home even new genera. Mr. Brown, a celebrated botanist, who went out with Captain Flinders, on a voyage of discovery to New Holland, in the year 1801, collected three thousand nine hundred different species, most of them new: and Sir Joseph Banks had previously found nearly

a thousand species, during the voyage in which New South Wales was discovered.

The whole number of plants, at present known, may be estimated at thirty-three thousand; without including those peculiar to New Holland. Those belonging to the class Cryptogamia, already published by various authors, exceed six thousand.


But we must come back to the class Didynamia; and we shall now examine the common Ground-Ivy, which is a good example of it. [See PLATE 15.]

There are two orders in this class, the first called Gymnosper'mia, with the seeds naked: the second, Angiosper'mia, having the seeds covered. Pull out one of the blossoms, and tell me to which of these the Ground-Ivy belongs.

EDWARD.

I suppose it must be in the first order; for I see four little seeds in the bottom of the cup, without any covering. But what were the two little white crosses that I saw in the blossom?

MOTHER.

They were the anthers; but you must not be too sure of their number, until you have opened the blossom; you will then find, that what you took for a cross, is in reality composed of two parts, so shaped, that when they meet in the middle, they look like a little cross:  . This is

what constitutes the principal distinction of the genus *Glecho'ma*, to which our plant belongs; and we shall now try, whether the remaining characters correspond with the description.

The cup is small, in proportion to the size of the blossom, and formed of one leaf, in five unequal divisions, each of which ends in a point. The upper lip of the blossom is upright, and slightly notched in the middle; the lower lip is large, turns down, and has three divisions, the middle one the broadest, and notched at the end. The style is thread-shaped, and the summit cloven into two pointed divisions. There is no seed-vessel, but the seeds are placed at the bottom of the cup, without any covering, as you have seen.—All this agrees so well with our specimen, that there can be no doubt about the genus.

There is but one native species of *Glecho'ma*, the *hedera'cea*; and it may be distinguished from the foreign ones by the leaves, which, you perceive, are nearly kidney-shaped, and scolloped at the edges. When rubbed on the under side, they have a pleasant smell; the upper side has none.—The figure of the leaf has been found to be of great use in the discrimination of the species; and botanists have therefore spared no pains to determine and describe its various forms, of which they generally enumerate upwards of a hundred. The size of the leaf varies much in different plants; but the largest

plants have not always the largest leaves: those of the marsh marigold, *Cal'tha palus'tris*, an humble herb, are larger than those of the oak. The largest leaves produced by any British species, are, I believe, those of the Burdock, *Arc'tium Lap'pa*, and the Butterbur-Coltsfoot, *Tussila'go Petasi'tes*; but these are very diminutive, in comparison with the leaves of some foreign countries. The leaf of the *Strelit'zia Regi'na*, an African plant, grows to the length of three or four feet, and measures eighteen inches at the broadest part. Those of the plaintain tree have been known to attain the length of ten feet, with a breadth of two feet at the base; and they are used in a variety of ways, to screen the inhabitants from the rays of the vertical sun. The largest leaves are found in tropical climates, where shade is most wanted.

Leaves are of very great service to the plants upon which they grow, by affording protection to the flower and fruit; and, accordingly, such tender fruits as require to be shaded from the sun-beams while young, are accompanied by leaves which are very large; while, in pear and apple-trees, and other fruits that do not need protection, the leaves are small.

EDWARD.

But if the leaves are so useful, why do not the trees die when they fall off?

MOTHER.

When vegetation, or the growth of plants, ceases, as is the case with many of them in this country during the winter, the leaves become unnecessary, and fall off or decay; but when warm weather approaches, new ones appear, and the plant begins to grow again. The under side of the leaf appears to be furnished with a great number of little vessels, or tubes, intended to imbibe the moisture of the air. M. Bonnet proved this by a very simple experiment: he placed a leaf of the white mulberry, *Mo'rus al'ba*, with its upper surface upon water, and found that it did not continue fresh and green for more than six days; but another leaf of the same tree, placed with its under surface upon water, continued fresh for six months. The upper surface of the leaf serves as a defence to the under side; and this position of the two surfaces appears to be essential to the health of the plant; for if a branch be turned upside down, in such a manner as to reverse the natural situation of the leaves, they will turn back again of themselves.

But we must return to the fourteenth class, where we left off.—You can now, probably, understand its natural character; which consists in the calyx being formed of one leaf, like a tube, — with five divisions, — and being permanent, or remaining upon the stalk until the seeds are ripe. The blossom is of one petal, the lower part like a tube; and

the border is divided into two parts like lips; from which last circumstance the flowers belonging to the class are called La'biate, or lipped, and some of them, from their resemblance to an open mouth, are said to gape or grin. In most instances the upper lip is like a hood or helmet, and the lower one spreads out, and is divided into three segments.

The plants of the order Gymnospermia are almost universally odoriferous, and none of them are poisonous. Lavender, Lavan'dula Spi'ca; several species of Mint, Men'tha; the common Marjoram, Orig'anum vulga're; Balm, Melis'sa; white Horehound, Marru'bium vulga're; and Vervain, Verbe'na officina'lis, are among them; — and are all natives of England, except the lavender, which came originally from the south of Europe.

In the second order, Angiosper'mia, some of the species are poisonous; and the common Fox-glove, Digita'lis purpu'rea, which grows plentifully in England, though very useful in medicine, is one of these: — indeed every medicine would be poisonous, if taken in sufficient quantity. — The Honey-flower, Melian'thus, a cape plant, is of this class and order. It produces more honey than any other plant, and in such abundance, that a tea-spoonful may be collected every morning from each of its numerous flowers: but the strong and disagreeable smell of the plant when it is bruised, indicates a poisonous quality. — There is another flower, but of the class

Hexandria, the Crown Imperial, *Fritilla'ria imperia'lis*, which produces nearly as much honey; but the plant is so poisonous that bees will not collect it: we owe this beautiful plant, now so common, to Clusius, a professor of botany at Leyden, who received it from the East, along with the Horse Chesnut, more than two hundred years ago.

Vervain, *Verbé'na*, is another example of the order *Angiosper'mia*, of the fourteenth class.

EDWARD.

That is the plant in the greenhouse that has such sweet-scented leaves; they have a smell of lemon, even when they are dry.

MOTHER.

There are several species of *Verbé'na*, and the one you mean is the triphyl'la, or three-leaved Vervain. It is a native of Chili in South America. The leaves of several plants retain their aromatic smell for a long time, even in a dried state. Those of a great many *Geraniums* are very fragrant, and you are well acquainted with the odour of the leaves of Mint, Thyme, Rosemary, Lavender, and several other plants, commonly cultivated in gardens.

There are but few trees in the class *Didynamia*, and none of them are natives of this country. The Calabash tree, *Crescen'tia*, of which there are two species, the oval and the round fruited, *Crescen'tia*

Cujéte, and *Crescen'tia cucurbiti'na*, is in the order Angiosper'mia. Both the species are natives of the West Indies, and are easily propagated by seed. The wood of the tree is hard and smooth, and is used for making different kinds of furniture. The fruit varies in size from two inches to a foot in diameter; but the pulp is seldom eaten, except by cattle in time of drought. The small shells of the long-fruited species, are formed into spoons and ladles; and those of the round fruit into cups. The large shells, which sometimes hold fifteen pints, serve for boiling water in, and will bear the fire, as well as earthen pots.

EDWARD.

I think you have told me of very few trees that are natives of England, in comparison with other countries.

MOTHER.

When you consider how very small a part of the world England occupies, you cannot be surprised that the native trees are comparatively few in number: and I ought to have mentioned to you before, that the proportion of trees to herbaceous plants, is much more considerable in the countries near the equator, than towards the poles. But it is singular, that in some parts of North America, though the climate is colder than that of England,

the vegetation is richer. In the United States alone, it is supposed that more species are found, of the single genus *Quer'cus*, or oak, than there are, of different genera, in the whole of Europe.

Trees grow in such amazing profusion in many parts of North America, that great pains are taken to destroy them. The ground cannot be tilled, nor can the inhabitants support themselves, until they are removed; and the person who cuts down the largest number, and makes the fields about his house most free from trees, is looked upon as making the greatest improvements in the country. I have heard, that when some Americans landed on a part of the north-west coast of Ireland, which we should consider as very desolate and dreary, they expressed the greatest surprise and pleasure, at the beauty and improved state of a country, "so clear of trees."

EDWARD.

What curious things you tell me! I thought, at first, that botany would teach me only the names and shape of plants.

MOTHER.

You will find, as you advance, that what relates to the particular situations in which vegetables grow, and their distribution in different countries, is very interesting. Some species, for instance, are

confined to exceedingly narrow limits, while others are almost universally diffused over the world. A species of marjoram, *Orig'anum Tournefortii*, a plant in the class *Didynamia* discovered by Tournefort, a celebrated French botanist, in the year 1700, upon one rock only in the little island of Amorgos, in the Archipelago, was found eighty years afterwards, by Sibthorpe, another botanist, on the same island, and even upon the very same rock; but no one has ever yet observed it any where else.

Some plants grow wild on mountains only, and are called Alpine, from the word Alps, which signifies high mountainous districts: some grow in valleys only, others upon plains, and some are entirely confined to water, and therefore called Aquatic. Some require the hottest climates, some temperate ones, while others thrive no where but in the midst of ice. Asiatic plants are remarkable for their superior beauty; African for their thick and succulent leaves; and those of America for the length and smoothness of their leaves, and a sort of peculiarity in the shape of the flower and fruit. The flowers of Europe are seldom very beautiful.

The plants peculiar to the polar regions are generally low, with small compressed leaves, and flowers large in proportion: those of New Holland are distinguished by small and dry leaves, which often have a shrivelled appearance. In Arabia,

the plants in general are low and dwarfish; in the Mediterranean and Archipelago, they are generally shrubby, and furnished with prickles: while, in the Canary Islands, many that in other countries are merely herbs assume the appearance of shrubs and trees. Nature, however, has endowed some tribes with the capacity of growing in almost all climates; and this is fortunately the case with greens, and with eatable roots, such as carrots, turnips, potatoes, — so that they have followed man into all climates and quarters of the globe. Between the tropics, where the degree of heat is always high, it often happens, that plants flower more than once in the year, for they are not there kept back by an unfavourable temperature.

Light also, as well as heat, has a great effect upon the colour and growth of plants, so that, when they are deprived of it, they become white and colourless, and shoot up into pale weak stalks. The outer leaves of a cabbage are green, but the heart, or inner part, is nearly white, merely from being shut up. Potatoes often grow in cellars, where there is but little access to light and air; and the stems shoot to a great length towards the light, but they are very weak, and trail upon the ground. I have myself seen plants, which had grown in dark rooms or cellars, and were perfectly white, gradually become green on being exposed to the light.

EDWARD.

Then does the gardener cover up endive and celery with earth, to make them grow white?

MOTHER.

He does, my dear; and earthing them up in this manner, is called blanching. The position of the leaves of plants, is strongly affected by the action of light, to which they uniformly turn their upper surface: and it has been remarked, that the ripe ears of corn, which bend down with the weight of the grain, scarcely ever incline to the north, but always turn in a greater or less degree to the south, or towards the sun; you may observe this yourself in a field of ripe corn. The opening of flowers is also effected by light; many of them do not fully expand their petals, except when the sun shines, —and hence open them during the day, and shut them at night alternately. There are some instances, however, of flowers that open only in darkness; and which shut up their blossoms on the approach of light: M. Decandolle, a French botanist, who tried some curious experiments on this subject, found that the *Mirab'ilis Jal'apa*, Marvel of Peru, opened its flowers, when put into a very dark place, but shut them at night when artificial light was introduced.

Trees show how beneficial the influence of light is to them, by their branches being generally thicker

and more full of leaves on the side exposed to the sun, than on the opposite one. — And the knowledge of this circumstance is very useful to the Laplanders, who are unacquainted with the compass, and would lose their way in their long journeys, through wild districts without roads or paths, if they were not guided by various natural appearances, which enable them to distinguish the points of north and south. — The inhabitants of several other countries also make great use of their observations on the different appearances of nature. Some tribes of American-Indians plant their corn “when the wild-plum blooms,” or “when the leaves of the oak are about the size of a squirrel’s ears:” and some of their months are named from the state of vegetation; one is called the budding month, another the flowering month, one the strawberry, and another the mulberry month; and the autumn is expressed by a term which signifies the fall of the leaf.

CONVERSATION THE FOURTEENTH.

CLASS 15. TETRADYNA'MIA. — ORDERS. — CHEIRAN'THUS CHEI'RI, COMMON WALL-FLOWER, EXAMINED. — CLASS 16. MONADEL'PHIA. — ORDERS. — MAL'VA SYLVES'TRIS, COMMON MALLOW, EXAMINED. — YEW-TREE. — PINES; THEIR VARIOUS USES. — COTTON-PLANT.



MOTHER.

I HOPE, Edward, that we can examine two plants to-day, — which I know will give you pleasure, — for I have not much to tell you about the fifteenth class, Tetradynamia. Do you recollect how it is distinguished?

EDWARD.

The flowers contain six stamens, four of them long, and two short.

MOTHER.

You are quite right; but as the difference of their length is not always very striking, and the plants of the sixth class contain the same number

of stamens, it will save you trouble, to remember that the flowers of the class Hexandria never have four petals, while those of the fifteenth class always have that number. The last are generally called Cru'ciform, or cross-shaped, from the four petals being so placed as to form a kind of cross; and this circumstance forms the natural character of the class Tetradynamia.

In moist situations, and during wet seasons, the cruciform plants become acrid, which signifies having a hot and biting taste, like mustard, but none of them are poisonous. Even the common Turnip, Bras'sica Ra'pa, whose root in a dry sandy soil is so sweet and juicy, becomes, in wet land, hard, and disagreeable to the taste; and the common Horse-radish, Cochlea'ria Armora'cia, when it grows near water, is so extremely acrid that it can hardly be used.

The orders of this class, you may remember, are two; and are distinguished from each other by the shape of the seed-vessel, which in both is a Pod. In the first order, Siliculo'sa, the pod is broad and short; and in the second, Siliquo'sa, it is long and narrow.

The first order contains about twelve native genera; among which are the Sea-kale, Cram'be marit'ima; Shepherd's-purse, Thlas'pi Bur'sa-pas-to'ris; Candy-tuft, I'beris ama'ra, which is very often cultivated in flower-gardens; and common



Cheiranthus Cheiri — *Common Wall Flower.*
Class XV. TETRADYNAMIA — Order SILIQUOSA.

Whitlow-grass, *Dra'ba ver'na*, a pretty little plant, which shows very well the effect of climate upon vegetables; for in Sweden it flowers in the month of April; in Germany, in March; in England, Holland, and France, in February; and in Sicily it is in flower all through the winter.

The second order, *Siliquo'sa*, contains about eleven native genera, some of which we use as food. The common Water-cress, for instance, *Sisym'brium Nastur'tium*; the Turnip, *Bras'sica Ra'pa*; Cabbage, *Bras'sica olera'cea*; Rape, *Bras'sica Na'pus*, which is chiefly cultivated for the sake of the oil that is procured from its seeds; Mustard, *Sina'pis ni'gra*; and the Radish, *Raph'anus Raph-anis'trum*. The Chinese Cabbage, *Bras'sica chin-en'sis*, is to the people of China nearly what the potatoe is to the Irish. It is prized by all classes, and is considered a necessary of life: it often weighs from fifteen to twenty pounds, and reaches the height of three or four feet. — The leaves are used raw, as salad; and, when boiled, they have the flavour of asparagus.

The Wall-flower, too, that you may recollect having brought in from the garden, to learn from it the different parts of a flower, is in this second order. It is a good example of the class, and we will now examine its character. [See PLATES 16, and 1.] —

The pods that contain the seeds, you perceive,

are long ones; the order therefore is Siliquosa, in which there are two divisions of the genera, — one having the calyx open, with the leaflets spreading: the other, to which this plant belongs, having a close cup, and the leaflets approaching each other at the top. This genus is named Cheiran'thus, and is distinguished from the others, of the same division, principally by two little roundish bodies, called glands, which surround the bottom of the two shorter stamens; but they are not very distinct without the assistance of a magnifying-glass: [see PLATE I.] these glands form the nectaries of the Wall-flower, as I have already mentioned to you. — The cup consists of four upright spear-shaped leaflets, of which the two outermost bulge, or swell a little, at the bottom. There are four petals, forming a cross, the claws of which are as long as the cup. The four long stamens are of the same length as the calyx; and the two shorter ones are curved outwards at the lower part, — being pushed out, as it were, and made to appear shorter, by the glands that surround them at the bottom. The anthers are long, upright, pointed at the top, and cloven at the bottom. The germen is as long as the filaments, and supports a very short style, with a divided summit. The seed-vessel is a long pod, containing several flat egg-shaped seeds.

The specific name of our plant is Chei'ri. It is supposed by several botanists to be a variety of

the native species, *Fruticulo'sus*, and is so common in all our gardens, that I wished to examine it with you. It differs, however, from the plant that grows wild on old walls, and roofs of houses, in having somewhat larger flowers, with petals not of an uniform yellow, but stained with brown or rust colour; but the two plants are very nearly alike. The leaves are spear-shaped, and the stem somewhat shrubby.

There are two other native species of *Cheiranthus*; one of which, the *inca'nus*, or Stock-gilly-flower, is very much cultivated in gardens, but has been found wild only in one place in England. The *sinua'tus*, or Sea-stock, grows upon the sea-shore: and in both these species, the flowers are purplish, and the whole plant is covered with a short whitish down.

EDWARD.

The stem of the Wall-flower is so woody, that it is very like a shrub. Is it one?

MOTHER.

No, my dear; but from its having a woody stem, it is called shrub-like. It is a perennial plant; and in old gardens I have seen the stem so thick, and so like wood, that I could almost have mistaken it myself: and I have been told that it will grow very well from cuttings, in which it agrees with shrubs.

We have now done with the class Tetradynamia; and as I am afraid that the character of the sixteenth class, Monadelphia, is not easily remembered, we shall look at your drawing, and go over the description again.

EDWARD.

Here it is [see PLATE 2.]: the filaments are all joined at the bottom, but separate at the top.

MOTHER.

Yes; and the class is called Monadelphia, from two Greek words, which signify one brotherhood. In most of the classes that we have already examined the orders are determined by the number of pistils; but in this one the number of the stamens determines the order. All the genera hitherto discovered come under eight orders, but only three of them contain plants which grow wild in England: Triandria with three stamens, Decandria with ten, and Polyandria with more than twenty.

In this class, the calyx is of the utmost importance, and is the part by which the different genera are principally distinguished.

The order Triandria contains, according to Withering, one native genus; and there is only one native species of it, the Juniper-tree, *Juniperus commu'nis*.* The berries of this plant are two years

* Class Dioecia, order Monadelphia, of Linnæus.



Stamens & Pistil magnified

Pistil

Malva sylvestris Common Mallow.

Class XVI. *MONADELPHIA* Order *POLYANDRIA*.

in ripening, and afford an oil, which gives the flavour to gin or juniper-water. The ripe berries, when dried, were used in this country as we now use pepper, before that spice became common. The bark is sometimes made into ropes, and the wood is hard and durable. Frankincense, which is the produce of another species, *Junip'erus lycia*, is brought to this country from Turkey and the East Indies, but principally from Arabia. The wood used in making black-lead pencils, and commonly called Cedar, is that of a species of Juniper, *Junip'erus bermudia'na*, which grows to a considerable size.

The Tamarind-tree, *Tamarin'dus in'dicus*, whose fruit is so delightfully acid, is a native of the East and West Indies, and belongs also to this order.

The Gera'nium, of which there are several native species, and a great number of foreign ones, is the only genus in the order Decandria, of the class Monadelphia. It has, however, been divided by M. L'Heritier, a French botanist, into three genera — *Ero'dium*, *Pelargo'nium*, and *Gera'nium*; the first two in the class Pentandria, the last only in Decandria. The Geraniums found in Africa are much larger, and have far more beautiful flowers, than those which grow in Europe.

In the order Polyandria, there are, according to Withering, five native genera: the Marsh-

Mallow, *Althæ'a*; common Mallow, *Mal'va*; tree Mallow, *Lavate'ra*; the Yew-tree, *Tax'us*; and the Fir or Pine-tree, *Pi'nus*: but the last two genera are in the classes *Dioecia* and *Monoecia* of Linnæus.

EDWARD.

I have seen the common Mallow so often, that I should like to examine it.

MOTHER.

Well then, bring in some of it, and we will go through the description. You cannot fail to meet with it in the next hedge.

EDWARD.

It looks as if there were two calyxes. [See PLATE 17.]

MOTHER.

It has what is called a double calyx, or one within another; and it is the structure of the outer calyx, which is distinctly composed of three leaves, that constitutes the principal character of the genus *Mal'va*; *Lavate'ra* having an outer cup of one leaf, with three divisions only, not three separate leaves; and in *Althæ'a*, of which the Hollyhock in our garden is a Chinese species, the divisions are nine. The inner cup of the *Mal'va* is of one leaf, with five

shallow divisions. The blossom is composed of five heart-shaped flat petals, united at the bottom to the tube formed by the filaments. The middle of the receptacle rises like a little pillar; and the seed-vessels, which are generally eight in number, with one seed in each, stand round it in a circle.

There are three or four native species of *Mal'va*: ours, which is the *sylves'tris*, or common Mallow, is distinguished from the others, by having a rough, upright, and somewhat woody stem; and hairy leaves, with five or seven divisions, — the edges unequally notched, and a dark purplish stain on the lower part of each, near the stalk: the leaf-stalks and fruit-stalks are hairy. The ancients made considerable use of mallows in their food; but these plants are no longer employed for that purpose.

Of the Yew-tree, *Tax'us*, there is but one species, *bacca'ta*, native in England, the wood of which is uncommonly hard, tough, smooth when cut, and beautifully veined with red. It is so durable, that it is a common saying, amongst the inhabitants of New-Forest in Hampshire, that a post of yew will outlive a post of iron.

The Yew, though of slow growth, sometimes attains a very considerable size. Pennant mentions one in Fontingal church-yard, in the Highlands of Scotland, the ruined trunk of which measured fifty-six feet and a half in circumference; and I

have myself seen one at Crowhurst in Sussex, the stem of which measured more than thirty-six feet round.

The genus Pi'nus*, or Pine, includes several species; but the only native one is the Scotch Fir, Pi'nus sylves'tris, which grows plentifully throughout the Highlands of Scotland. When this tree is planted in a grove, the trunk becomes tall and naked; but in open sunny places it sends off numerous branches. It is said to live sometimes to the age of four hundred years. The wood, which is called red deal, is very smooth and light. The bark will tan leather, and in years of scarcity it is dried, ground to powder, and made into bread, by the people of the north of Europe. The inhabitants of the Scottish Highlands dig up the roots, and divide them into small splinters, to burn instead of candles; for they contain a great quantity of resin, and easily take fire.

The black Spruce, Pi'nus ni'gra, is a native of North America. The young shoots of this species are used for making spruce-beer.

The Cedar of Lebanon, Pi'nus Ce'drus, grows on mountains in the Levant, especially on the celebrated Mount Lebanon, from which it takes its name. The wood is not destroyed by insects, in consequence of its bitter taste, which they cannot

* Class Monoecia, order Monadelphia, of Linnæus.

endure; and for this reason the ancients used tablets of cedar to write upon, and smeared their books and writings with a juice drawn from the wood, to preserve them. Solomon's temple and palace, it is supposed, were built of this wood.

The Larch-tree, *Pinus La'rix*, is a native of the Alps and Appenines, where it sometimes grows to the height of nearly two hundred feet. The wood is said to be more durable even than oak, and has the valuable property of not warping or shrinking. It was used by painters more than any other, before the use of canvass become general: several of Raphael's pictures are painted on boards of this wood. The piles upon which the houses of Venice were built, many hundred years ago, are of larch, and are still fresh and sound. The resinous substance erroneously called Venice-turpentine, is extracted from this tree.

The Norway Pine, *Pinus A'bies*, affords the white deal, the wood that is employed for so many useful purposes in England; and it is from the sap of this species that pitch, tar, common resin, and turpentine are obtained. You will find an account of the method of preparing these different substances very curious.

EDWARD.

What are the cones that we see on the fir-trees in the shrubbery?

MOTHER.

They are the seed-vessels or fruit of the fir : — the Cone, or Strobílé, as botanists call it, is a tough, woody seed-vessel, consisting of the general receptacle, with a number of hard scales attached to it. When the fruit of the pine is mature, these scales lie on each other, like tiles ; covering the seeds, or nuts, so completely, as to have the appearance of one undivided body. In this state, the cone hangs upon the tree during the winter-season, and protects the inclosed seeds ; but as soon as the warm weather comes, the scales begin to shrink and separate, leaving openings for the ripe seeds to escape. If a number of cones happen to burst at the same moment, which is often the case, the noise can be heard at a considerable distance.

EDWARD.

Are there any other useful plants in this class, besides the pines ?

MOTHER.

That which produces cotton is the principal one that I recollect. The botanical name of the genus is *Gossypíum*, and all the species at present known are natives of the East and West Indies. What we call cotton, is a soft downy substance, that surrounds the seeds ; which, in one species, the common cotton, *Gossypíum herbaíceum*, is of a snowy

white: but in the species *barbaden'se*, which grows in great perfection in the Chinese province of Kiang-nan, of which Nankin is the capital city, it is, in its natural state, of a yellow colour inclining to red; and the kind of cloth called Nankin, which is made of it in that country, is of great value, because it is very strong, and fades very little, even after long use and frequent washing.

CONVERSATION THE FIFTEENTH.

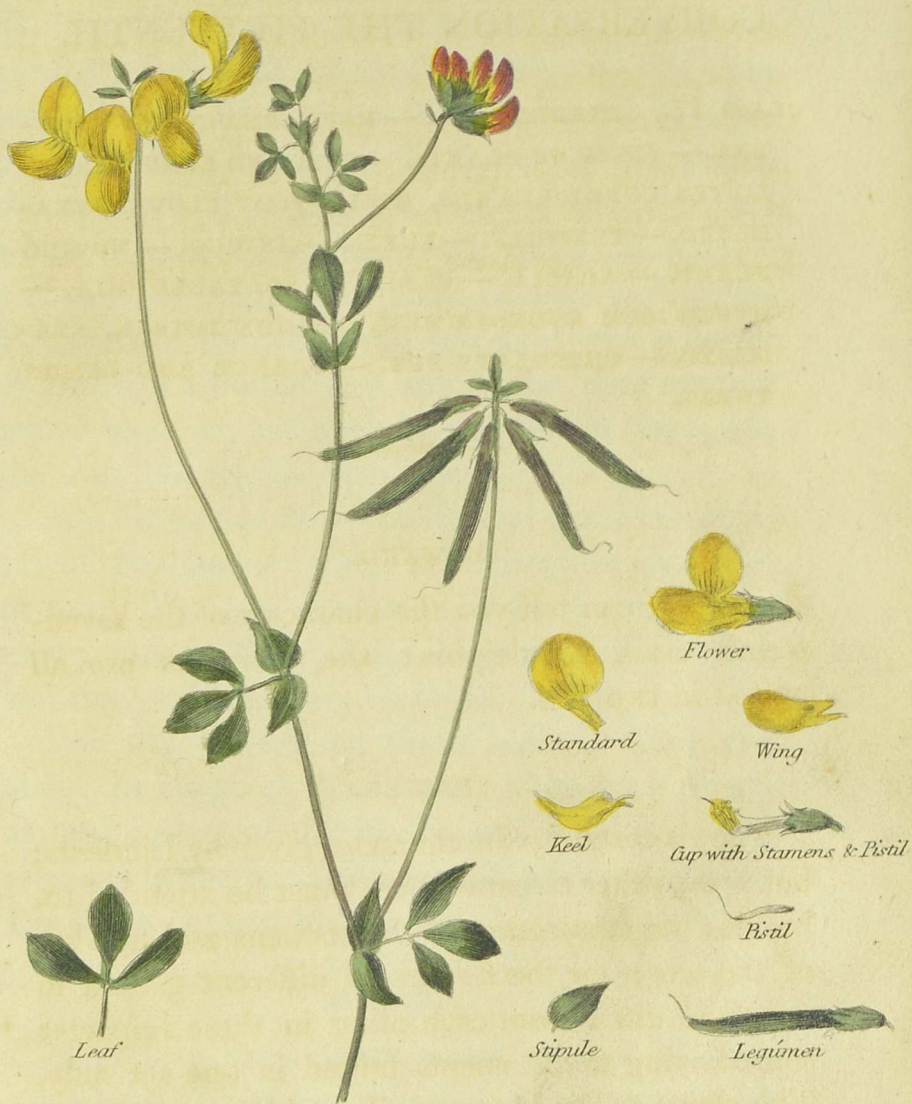
CLASS 17. DIADEL'PHIA. — PAPILIONA'CEOUS FLOWERS. — SLEEP OF PLANTS. — POD AND LEGU'MEN. — LO'TUS CORNICULA'TUS, BIRD'S-FOOT CLOVER, EXAMINED. — TREFOILS. — FURZE. — INDIGO. — MOVING PLANT. — ACACIA. — CLASS 18. POLYADEL'PHIA. — HYPER'ICUM ANDROSÆ'MUM, COMMON TUTSAN, EXAMINED. — CHOCOLATE-NUT. — ORANGE AND LEMON TREES.

EDWARD.

I THINK I can tell you the character of the seventeenth class, Diadelphia: the filaments are all united in two sets.

MOTHER.

That is certainly the character given by Linnæus: but some other circumstances must be attended to, besides the connection of the stamens and number of the sets; for the flowers of different genera in this class differ from each other in these respects; some having the filaments united in one set only. The shape of the blossom will enable you to decide in doubtful cases; for it is always irregular, that is, the petals are unequal and of different figures;



Lotus Corniculatus - *Birds foot Trefoil*.

Class XVII. *DIADELPHIA* - Order *DECANDRIA*.

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 the names of the authors and the titles of their works. The list is
 arranged in a columnar fashion, with the names on the left and the titles
 on the right. The names are written in a cursive hand, and the titles
 are written in a more formal, printed style. The list includes the names
 of several prominent figures of the time, and the titles of their
 most important works. The list is followed by a section of text
 which appears to be a preface or an introduction to the works listed.
 This section is written in a cursive hand, and it contains a
 detailed account of the circumstances under which the works were
 written. The text is arranged in a columnar fashion, with the
 main text on the left and a smaller section on the right. The
 smaller section appears to be a list of names and titles, similar
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and in general it has some resemblance to a butterfly, like the sweet-pea blossom that you see in the garden; for which reason the flowers of this class are called Papiliona'ceous, from the word Papil'io, the Latin for a butterfly. In flowers of this shape, the number of stamens is most commonly ten; which in some instances are all quite distinct; — and then, of course, the plant belongs to the class Decandria: but whenever you meet with a flower shaped like a butterfly, if any of the filaments are joined together, you may be sure that it belongs to the class Diadelphia of Linnæus.

The Orders of this class depend upon the number of the stamens; which are either five, six, eight, or ten. The last number is by far the most common; nine of the stamens being generally united, and the tenth standing by itself.

You will understand better what I have said about the shape of the flowers, when we have examined a plant of this class; and I think I have seen one in the meadow near the gardener's house. Let us go out and look for it.

EDWARD.

Here is a very pretty plant, with a blossom something like what you have just told me of; but the flower is so different from those we have already examined, that I don't think I can understand the parts, by myself.

MOTHER.

The shape of the blossom in this class is so peculiar, that its petals, which are five, are called by different names. Take off one of the flowers, and I will show them to you. [See PLATE 18.] This large uppermost one, that turns backwards, is called the Standard; the two next, which are both alike, and placed one on each side, are the Wings; the lowermost between the wings, is called the Boat or Keel, and is generally composed of one hollow petal, but sometimes of two: this contains within it the stamens and pistil, which it defends from rain.

The flowers of this tribe in general spread out their wings in fine weather, to admit the rays of the sun, and fold them up again as the night approaches.—I have lately read an account of the manner in which Linnæus first discovered this fact, which shows how attentive he was to the appearances of nature. A friend having sent him some seeds of a papilionaceous plant, he sowed them in his greenhouse, and they soon produced two beautiful flowers. The gardener was absent when these were first observed; and in the evening, when Linnæus took with him a lantern to see them, they were no where to be found; so that he himself supposed they had been destroyed by insects, or by some accident; but the next morning, to his

great surprise, he found his flowers just where they had been the day before. — He took his gardener therefore again in the evening to look at them; — they were not to be seen; but the next morning again he found them looking as fresh as ever. The gardener said, “These cannot be the same flowers; they must have blown since;” but Linnæus was not so easily satisfied: as soon as it was dark he once more visited the plant, and after lifting up all the leaves, one by one, he found the two flowers folded up, and so closely concealed under them, that it was impossible, at first sight to discover where they were. This led him to direct his attention to other plants of the same tribe, and he had the satisfaction to find that all their flowers possessed the property, in a greater or less degree, of closing at night; and this, for want of a better term, he called the Sleep of Plants.

Do you think you can find the germen or seed-vessel of the plant in your hand?

EDWARD.

I believe I can; but it is not very distinct.

MOTHER.

You will find it more so in the flowers that have shed their petals; but for the unripe ones, you must use your magnifying-glass.

EDWARD.

Is it not a pod? It is something like the seed-vessel of the wall-flower, and is full of little seeds.

MOTHER.

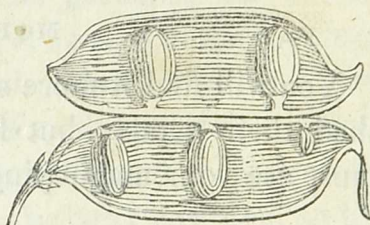
It is something like a pod; but there is a remarkable difference, which you must remember. In the seed-vessel of the wall-flower, you recollect, there was a partition between the two outer shells; upon both sides of which the seeds were arranged, being fixed alternately to different edges; but in this seed vessel, and you will see the same thing more plainly in the common pea, there is no partition; and all the seeds are fastened to one of the seams, in such a manner, that when the seed-vessel is opened, they lie alternately in the two shells. I have made a drawing to explain this to you more distinctly.



Pod, with one side opened.



Legu'men.



Legu'men opened.

This last kind of seed-vessel is called a Legu'men; and the plants that bear it are said to be Legu'minous. Very few of them are poisonous; indeed most of them produce very wholesome food for man and the larger animals; but there is one species found in the West Indies, called Jamaica Dog-wood, or Fish-bean, *Piscid'ia Erythrina*, the leaves and branches of which, when thrown into water where there are fish, have such an effect upon them, that they come up and float upon the surface, and may be easily taken with the hand. The seeds of the *Labur'num*, *Cyt'isus Labur'num*, and of Lupine, *Lupi'nus*, are also extremely noxious. I have heard of a child being killed by eating only three or four *Laburnum*-seeds; and Haselquist, a Swedish botanist, who travelled in the East, informs us, that the inhabitants of Egypt, who live near the banks of the Nile, and are frequently annoyed during the night by the Hippopotamus, or River-horse, a very large animal, which does great mischief to their gardens and fields, destroy this troublesome visitor by placing large quantities of Lupine seed near his haunts, which he devours greedily.

But let us examine our plant. [See PLATE 18.]
— If you reckon the stamens, which are of different lengths, you will find that there are ten; nine of them united together at the lower part, into a sort of membrane, which covers the ger-

men. The order, then, is Decandria; and this contains so many genera, that, for convenience, it is subdivided into six sets, four of which depend, chiefly, upon the shape and structure of the legumen. This plant belongs to the division that has a legumen of one cell, with several seeds: the name of the genus is Lo'tus; and the principal characters are, that the wings of the flower nearly meet at the upper part, and that the legumen is round and full. The species that we have, is the cornicula'tus, or Bird's-foot Clover; — which is distinguished by the heads of flowers being flat at the top, and consisting of a small number only; the legumens spreading out like the spokes of a wheel; and the stems generally trailing on the ground. The leaves have three divisions, of an oblong shape: and where they spring from the stalks, there are two little leaves, called Stipules, which are of a different figure from the divisions of the leaf itself. The flowers, before they open, are of a red colour; but, when expanded, of a rich yellow. The plant varies very much in different situations: it is commonly Decumbent, or grows near the ground; but in meadows it is often upright, like this specimen.

The Lo'tus is one genus of a very numerous tribe of plants, that are in general called Trefoils, from the genus Trifo'lium, which signifies three-leaved, because each leaf looks like three. The common

English name is Clover, and almost all the kinds are of great value to farmers, for they afford good pasture for cattle, and make excellent hay.

EDWARD.

I have often seen both purple and white clover; but I do not think the flowers looked as if they were butterfly-shaped.

MOTHER.

You probably take each head of clover for a single flower; but if you examine one, you will soon find that it consists of a great number of small flowers; each of which has its own little calyx, with a blossom as perfect as that of the Lo'tus, and composed of a standard, two wings, and a keel. But you must look at them through your magnifying glass, if you wish to see the stamens and pistils distinctly.

EDWARD.

How pretty the little flowers must be! When I go out to-day I will gather some clover, and examine it. — Are the peas and beans, that we eat, in this class, as well as the sweet-pea in the garden?

MOTHER.

They are, my dear; and in the order Decandria also; as are likewise the Kidney-bean, Phase'olus

vulga'ris; the Vetch, *Vicia*; wild Liquorice, *Astrag'alus*; and Saintfoin, *Hedys'arum*. The botanical name of the Pea is *Pi'sum*, and the species that we eat is the *sati'vum*, of which there are several varieties. The Bean is a species of vetch, *Vicia Fa'ba*: but neither of the last-mentioned species are natives of England. The pea came originally from the south of Europe; and a great many varieties of the seed have been produced by cultivation, which differ very much from each other in size and flavour. The bean is a native of Egypt.

The garden Sweet-pea is a native of Sicily; its botanical name is *Lath'yris odora'tus*.

The common Broom, *Spar'tium scopa'rium*, belongs to this class, and grows wild in England, as well as the Dyer's Green-weed, *Genis'ta tincto'ria*, and the Furze, *U'lex europæ'us*, that you see in such large bushes on the heath. This last shrub, though it is so abundant in England, is by no means common in other parts of Europe: Portugal and France produce it more plentifully, perhaps, than any other country except our own. When Linnæus came to England, in the year 1736, he was so much delighted with the golden bloom of the furze, which he saw for the first time on the commons near London, that, it is said, he fell on his knees to admire it. In Cornwall this plant grows, with great luxuriance, to the height of six or eight feet; but it will not bear severe cold.

Linnæus tried to preserve some plants of it through the winter in Sweden, under cover, with as much care as we bestow on hot-house plants, but without success.

Dyer's Green-weed, *Genis'ta tincto'ria*, is a native of England, and is frequently to be met with on dry barren banks in the borders of fields. The whole of the plant dyes a yellow colour, which is preferred to all other yellows for colouring wool: and by means of Woad, *Isa'tis tincto'ria*, a plant in the fifteenth class, which affords a blue tint, the yellow can afterwards be made green.

The name of Plantagenet, of which you read so much in the history of England, is supposed to be derived from this plant. Fulke, Earl of Anjou, who lived a century before the Norman conquest, was enjoined, by way of penance for some crime which he had been guilty of, to go to the Holy Land: he wore, it is said, a sprig of *genista* in his cap, as a symbol of humility, and afterwards adopted from it the title of Plantagenet, *Planta-genis'ta* or *genes'ta*, which his descendants retained.

The remaining plants of the class *Diadelphia*, that I shall mention to you, are not natives of England.

That which affords the Indigo, with which blue cloth is dyed, *Indigo'fera tincto'ria*, *Diadelphia Decandria*, is a native of the East Indies. The

dye is a light substance, somewhat of the consistence of raw starch, but of a deep blue colour, and is obtained by steeping the leaves and small branches of the plant in water, and drying the sediment which they deposit. In its prepared state indigo is poisonous; but the plant itself is harmless. All the different species of *Indigofera* afford it; which is the case also with several other leguminous plants. The leaves of the *Lo'tus corniculatus*, as they dry, become blue.

There is a foreign species of Saintfoin, called the Moving plant, *Hedys'arum gy'rans*, of a genus belonging to the class *Diadelphia*, which is very remarkable. It grows on the banks of the river Ganges, near Bengal, in the East Indies, and was first known in England in the year 1772, when it was produced from seeds brought from India. It is an annual plant, and grows to the height of three or four feet: the leaves are of a bright green colour, and the flowers generally of a pale red. Its leaves possess the property of moving spontaneously, without being touched; sometimes one of them will move suddenly, while the rest remain still; at other times they all move together, or separately, without any regularity; and even when detached from the plant they still retain their power of motion.— You will find hereafter, that there are several other marks of a sort of feeling, among plants of different tribes. The



A group of stamens

Pistils

Berry

Hypericum Androsæmum — *Tutsan*.

Class XVIII. *POLYADELPHIA* — Order *POLYANDRIA*.

Sowerby. sc.

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leaves of the trefoils always fold up when rain approaches.

Gum Trag'acanth is the produce of another plant in the order Decandria of this class, the great Goat's-thorn, *Astragalus Tragacantha*, — a thorny shrub, which grows in the islands of the Levant. A gum exudes from its stem and branches resembling the gum-arabic in many of its properties; it is used in medicine, calico-printing, and in making ink.

The Acacia-tree, *Robin'ia Pseu'do-aca'cia*, which is so much admired in our shrubberies, has such very brittle wood, that a slight blast of wind is sufficient to break off its branches, and it is consequently not fit for exposed situations; but it makes amends for this defect, by sending up from its roots innumerable suckers, which grow very rapidly. I have read of a farmer, at Long Island, in North America, who, during the year of his marriage, planted a field of fourteen acres with suckers of this tree, as a provision for his children: when his eldest son married, at twenty-two years of age, the farmer cut down about three hundred pounds worth of timber, out of his acacia wood; which he gave his son to buy a farm with. Three years after, he did the same for one of his daughters; and in this way he provided for his whole family in succession. — The wood, in the mean time, repairing by its suckers all the losses that it sustained.

We are now, Edward, to begin the eighteenth class, Polyadelphia. —

EDWARD.

Is it not in the flowers of this class that the Stamens are united into more than two sets ?

MOTHER.

Yes; but in some species the filaments are so much separated, that unless you examine them quite down to the bottom, you might suppose that they were all distinct, and consider the plant as belonging to the class Icosandria or Polyandria.

The Orders, according to Linnæus, depend upon the number of the stamens; and the plant that I have chosen for you to examine [see PLATE 19.] belongs to the third order, Polyandria, which contains plants with very numerous stamens, not fixed to the calyx.

In the genus Hyper'icum, the only genus of native plants in this class, the calyx is placed below the germen, and has five divisions; the petals are five in number, and blunt at the ends; the stamens are very numerous, like hairs, and united at the base into three or five sets, corresponding with the number of the styles: the capsule contains several seeds, and is round, and divided also into as many cells as there are styles.

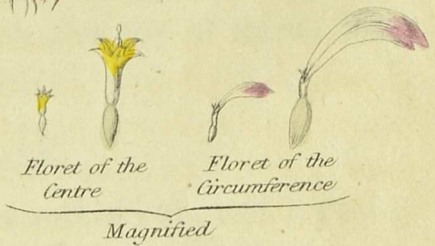
This species of *Hypericum*, the *Androsæmum*, though not very common in England, happens to grow in our neighbourhood, and shows the character of the class very distinctly. It may be known from the others, by having three pistils, — a shrub-like stem with two edges, — and fruit consisting of a pulpy berry, which is black when ripe. The flower is large, and of a rich yellow colour; and the plant grows naturally in woods, and in damp ground under hedges: it generally blossoms in July and August, but the flowers seldom expand fully except in very bright sunshine. The English name of our species is Tutsan.

The most remarkable foreign genera of this class are the Chocolate-nut-tree, *Theobroma Cacao*; the Orange and Citron trees, *Citrus Aurantium* and *Medica*, of which last the Lemon and Lime are varieties; and the *Caju-Puti*-tree, *Melaleuca Leucaden'dron*, a native of the East Indies, from which *Cajaput* oil is obtained. — The Chocolate-nut-tree is very handsome, and grows naturally in South America, where it attains the height of twelve or sixteen feet: it bears leaves, flowers, and fruit, all the year round: the seeds are very nourishing; they are generally ground to powder and made into a paste, in which state they are much used in America. — The orange and citron trees are very handsome evergreens, and are frequently cultivated in green-houses in England; but they are gene-

rally much smaller with us than in their native country — the warmer parts of Asia, where they grow to the height of twelve or fifteen feet. From one of the varieties of orange-tree, the perfume called bergamot is obtained: it is said to have derived its name from Bergamo in Italy. Although the oranges produced in Malta are now the most esteemed in Europe, the fruit was not known to the ancient Greeks or Romans. Orange trees sometimes live to a great age, and there is one now in the gardens of Versailles, near Paris, more than four hundred years old.



Flower cut down to show the Receptacle



Floret of the Centre

Floret of the Circumference

Magnified

Bellis perennis - Common Daisy.

Class XIX. SYNGENESIA - Order POLYGAMIA SUPERFLUA.

CONVERSATION THE SIXTEENTH.

CLASS 19. SYNGENE'SIA.—STRUCTURE OF A COMPOUND FLOWER.—AGGREGATE FLOWER.—NATURAL CHARACTER OF THIS CLASS.—CALYX, SEEDS, AND DOWN.—ORDERS.—BEL' LIS PEREN' NIS, COMMON DAISY, EXAMINED.—OTHER PLANTS OF THIS CLASS.



MOTHER.

I HAVE brought in a Daisy, Edward, for you to examine this morning; and before I tell you any thing of the nineteenth class, Syngenesia, to which it belongs, we will try to find out how the flowers are constructed. [See PLATE 20.]—At first, you perceive, they do not look like any of those that you have already examined.

EDWARD.

No, indeed!—There is a sort of cup, and a great many white and pink petals; but instead of stamens and pistils in the middle, I see only a great number of yellow dots. What are they?

MOTHER.

Pull off all the parts that are within the cup, and look at them again with your magnifying glass.

EDWARD.

Oh! now I see that the yellow spots were the tops of beautiful little things like flowers; and these, I suppose, are seeds, below them.

MOTHER.

Well; now I shall open one of these little flowers with my needle, for it requires some practice, and you cannot do it so readily yourself. — Can you perceive with your glass, that each little blossom is shaped like a funnel, with five divisions in its border? — The stamens are so small in the daisy, that you can hardly see them: but in larger flowers of this class, you will find that they are five in number, with the filaments distinct, but the anthers joined together, side by side, like a tube; a single pistil with a notched summit passing up through this tube, — and an egg-shaped seed below.

EDWARD.

How very beautiful it is!

MOTHER.

Now look at what you called the white and pink

petals, and try if you can describe one of them as they appear to you.

EDWARD.

They look like little blossoms too, but they are very different from the yellow ones. There is a long white part, tipped with red, coming out from one side; and the blossom looks as if the other petals had been torn off.

MOTHER.

The white part is one of the divisions in the border of the little blossom, but much longer than the rest; you see it is shaped something like the head of a spear, blunted, with a very slight notch at the end; and you will find, with your glass, that the other part of the border, which you thought was torn, has three very small teeth. Upon opening the blossom, you perceive that there are no stamens, but the style comes up from the seed through the tube of the blossom itself, and has two summits curled a little backwards. There is no seed-vessel: but the seeds, as in the little yellow flower that we have just examined, are single, naked, shaped somewhat like an egg a little flattened, and placed immediately below the blossom. Now, if you look at the receptacle, from which we have pulled off all these little flowers, you will find that it stands up, like a sugar-loaf, in the middle of the

cup, and is dotted all over with little holes; these are the places in which the seeds were fixed; and when I cut down through the sugar-loaf, you see that it has a soft pith within. [See PLATE 20.] This flower is called the Daisy, or the eye of the day, from its opening to the rising sun. When the sun is declining, the flower shuts itself up, as if to take its rest. — It has always been a favourite with poets; and Chaucer, who lived in the fourteenth century, and was one of the first to take notice of the opening and shutting of flowers at particular times of the day, expresses great partiality for it.

EDWARD.

And is every daisy that we see in the fields made like this, of so many beautiful little flowers?

MOTHER.

All the flowers of this class, — not only the Daisy, but the Dandelion, the Thistle, and a great number of the most common wild flowers, are formed nearly in the same way; and their separate parts, when highly magnified, are equally beautiful and curious. But there are differences in their shape and arrangement, that enable botanists to divide the class into orders and genera, which you will now be able to understand. I shall not, however, give

you more than a general explanation of them; for I do not advise you to examine many plants of this class, until you are better acquainted with those that have larger and more simple flowers.

The class Syngenesia comprehends the flowers which botanists call Compound, — that is, which are composed, like the daisy, of a number of small flowers, or Florets, all placed upon the same receptacle, and within one common calyx: the stamens being five in number, with distinct filaments; but the anthers united side by side, so as to form a little tube.— Flowers which are composed of florets, in which the anthers are not united into a cylinder, are called Aggregate Flowers; as the Scabious and Teasel, in the class Tetrandria.— And you must remember this; for the general appearance of these plants might otherwise lead you to suppose that they belonged to the class Syngenesia.

The compound flowers are all so far alike, that this class has a very perfect natural character, which their general resemblance to the daisy will sufficiently point out to you, when you meet any of them: but the calyx and seeds, in particular, are worth your attending to.

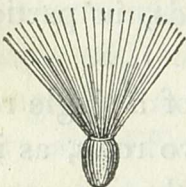
The calyx consists sometimes of a single row of leaves or scales; sometimes of two rows, as in the daisy; and in some flowers, as in the common Artichoke, the scales are placed over each other, alternately, like tiles upon the roof of a house. The

calyx, in many instances, opens as the florets expand, and closes when they fall off, as if to confine the young seeds; but as the seeds ripen and increase in size, it opens again to make room for them; and in some plants turns quite back, to let them escape. The Dandelion and Coltsfoot are in this last state, when you see their heads covered with down.

The seeds are, in several species, very remarkable: they are placed below the corolla, and there is never more than one to each floret. In many instances, they are tipped with a beautiful sort of down, consisting of a great number of spokes, or rays; these spokes, themselves, are sometimes branched or feathered; and in some cases, as in the common dandelion, the entire wheel is fixed upon a sort of stem, or pillar, which is itself fastened to the seed. Thus: —



Seed.



Simple
Down.



Feathered
Down.



Feathered Down
on a pillar.

The down is a beautiful object for the microscope; and its use is very important; for it enables the wind to carry the seeds to considerable distances from the plant, and, as it were, to sow them, in situations which otherwise they might never have reached.

EDWARD.

The down of the Coltsfoot is very soft like cotton. Is it ever made any use of?

MOTHER.

I have heard of its being used for making tinder. The poor people in the highlands of Scotland stuff pillows with the down of several different plants.

The Orders in the class Syngenesia are founded upon the uniformity or variety of the florets,—and on the manner in which the florets, when of different kinds, are disposed in the compound flower: for they may be all of one kind; or there may be some of one sort in the centre, and others of different structure in the circumference, or border of the flower.

In the first order, called *Polyga'mia equa'lis*, all the florets have both stamens and pistils; and each floret has one seed.

In the second order, *Polyga'mia super'flua*, the florets of the centre have both stamens and pistils;

but those of the border, pistils only : and all have seeds.

In the third order, *Polyga'mia frustra'nea*, the florets of the centre have both stamens and pistils ; but those of the circumference have neither.

In the fourth order, *Polyga'mia necessa'ria*, the florets of the centre have stamens only, without seeds ; and those of the border have pistils only, with seeds.

In the fifth order, *Polyga'mia, segrega'ta*, the flowers are not constructed quite as in the rest. The florets have all five stamens, with united anthers, and are all included in one general calyx ; but each floret has, besides, a little calyx of its own. Of this order there is no native genus.

EDWARD.

I am afraid it will be a long time before I know this class well ; for the orders are more difficult to understand than those of the other classes.

MOTHER.

You will soon find, that the experience you gain, by examining a few plants yourself, will remove whatever you now suppose to be a difficulty, and give you more instruction than any thing that I can tell you. The chief thing to be attended to, in the class Syngenesia, is the union of the anthers ; for

there are some flowers in the other classes, which at first you might suppose to belong to it, but whose anthers are not united; and with regard to the orders, it is only necessary to observe how the florets which contain the stamens and pistils are disposed in the compound flower.

Now let us go on to the generic and specific characters of our Daisy — The florets in the centre of the flower have both stamens and pistils; but those in the circumference pistils only: it is then in the second order, Polygamia superflua. The name of the genus is Bel'lis; which is distinguished from the other genera of the same order by the receptacle being conical, without hair or bristles; the calyx roundish; and the seeds egg-shaped, and without down. There is only one native species, the peren'nis, or common Daisy: and its distinctions from the foreign species are, that the flower-stalks have no leaves, each supporting a single flower; and that the root is Creeping, or spreading to some distance, and putting forth fibres. The daisy is in blow almost all the year round, but shuts up its flowers every night, and on the approach of rainy weather.

You can never fail to procure plants in this class, for it is a very numerous one, and contains several that grow wild in England. Among others, the Dandelion, Leon'todon Tarax'acum; Burdock, Arc'tium Lap'pa; Thistle, Car'duus; Tansey, Ta-

nace'tum vulga're; Coltsfoot, *Tussila'go far'fara*; Groundsel, *Senecio vulga'ris*; the Ox-eye Daisy, *Chrysan'themum Leucan'themum*; Blue-bottle, *Centau'ria Cy'anus*; and Chamomile, *An'themis nob'ilis*.—Of these, the dandelion is, perhaps, the most common, growing on rubbish and uncultivated land, as well as in meadows where you have seen it, and bearing flowers the greater part of the year. In France, this plant is very much used in salad; and at Gottingen, the roots are roasted and used like coffee by the poorer inhabitants. The juice of the roots and leaves is employed as a medicine in this country. The name *Leon'todon* is taken from the resemblance of the shape of its jagged leaves to the teeth of a lion; and the English name Dandelion, which is a corruption of the French *dent de lion*, expresses the same idea.

The Artichoke, *Cyna'ra Scol'ymus*; Dahlia; China Aster, *As'ter chinen'sis*; and Sun-flower, *Helian'thus*, of which there are several species, belong also to the class *Syngenesia*. The artichoke is a native of the south of Europe, where it is much more generally used than with us, and is even eaten raw with salt and pepper. The common Sun-flower, *Helian'thus an'nuus*, grows wild in Mexico and Peru; and the Jerusalem Artichoke, another species, *Helian'thus tubero'sus*, is a native of Brazil. The most highly esteemed vegetable

oil employed by the Russians is obtained from the seeds of the Sun-flower.

It is remarkable, that yellow is the prevailing colour in the flowers of this class; and that, although most of the plants are bitter, none of them are poisonous;—except, perhaps, the wild Lettuce, *Lactu'ca viro'sa*, when it grows in shady situations. There are no trees, or bulbs, and but few shrubs, belonging to it.

CONVERSATION THE SEVENTEENTH.

THE FOUR CLASSES OMITTED BY WITHERING. —
 CLASS 20. GYNAN'DRIA. — NATURAL ORDER OR-
 CHID'ÆÆ. — CLASS 21. MONOE'CIA. — BREAD-FRUIT-
 TREE. — MAIZE. — COCOA-NUT. — INDIAN RUBBER. —
 WATER-PROOF CLOTH. — TALLOW-TREE. — CASTOR-
 OIL PLANT. — MANCHINEEL-TREE. — OTHER VALU-
 ABLE TREES. — CLASS 22. DIOE'CIA. — WILLOWS. —
 DATE-PALM. — PISTA'CHIA. — MAS'TICK. — HEMP. —
 NUTMEG. — CLASS 23. POLYGA'MIA. — PLANTAIN. —
 SENSITIVE PLANT. — GUM-ARABIC. — FIG.

MOTHER.

YOU will be sorry to hear, Edward, that we have no plant to examine to-day.

EDWARD.

But there are twenty-four classes; and we have gone through only nineteen.

MOTHER.

Very true; but you may remember my having told you, that Dr. Withering, in his arrangement of British plants, has distributed those of the twentieth, twenty-first, twenty-second, and twenty-

third classes, among the first nineteen; according to the number of their stamens. And although this disposition of them has not been approved of by some very good botanists, I have thought it better, for the reason I have mentioned, to follow it at present, in speaking of the native plants of England.

The plants of foreign countries, however, which belong to these classes, are universally arranged according to the original method of Linnæus; and some of these are so curious and useful, that I wish to mention a few of them to you. Look at your drawing of the classes, [see PLATE 2. figures 20, 21, 22, and 23.] and you will find a short character of the four omitted by Dr. Withering; their names are Gynandria, Monoecia, Dioecia, and Polygamia.

In the twentieth class, Gynandria, the stamens grow upon the pistil itself,—either on the style or germen; and the orders depend upon their number. The plants which have this character the most distinctly, belong to a natural tribe called Orchid'ææ, which includes, besides other genera, the Or'chises, of which there are a good many native species. I have drawn the flower of one of these, in the table of the classes [fig. 20.], to give you an idea of the general appearance of the tribe; but as their structure is not easily understood, I shall not at present say any thing more about them. From the root of one species, Or'chis

ma'scula, the early purple Orchis, the substance called Salop is prepared.

All the flowers of the classes Monoecia and Dioecia, and some of those in Polygamia, are imperfect; that is, they want either stamens or pistils.

In the twenty-first, Monoecia, [PLATE 2. fig. 21.] some of the flowers have stamens only, and others, on the same plant, only pistils: but none of them have both. This class contains a number of curious and important genera.

The Bread-fruit tree, *Artocar'pus inci'sa*, Monoecia Monandria, which is very valuable to the inhabitants of the South-Sea Islands, belongs to one of these genera. It grows to the height of about forty feet, and the fruit, which is as large as a child's head, hangs upon the boughs like apples. The eatable part lies between the skin and the core, and is very white, soft, and of the consistence of new bread, with a sweetish taste, like that of the Jerusalem artichoke; but it must be roasted before it is eaten. It is in season for about seven months of the year, and during the whole of that time supplies very wholesome and agreeable food to the inhabitants of the islands; who also make cloth of the bark of the tree, and use the wood in building their huts and canoes. There is another species of this genus, the *Artocar'pus integrifo'lia*, or Indian Jaca tree, which is a native of the East

Indies: the fruit is said to weigh about thirty pounds, and is used as food, but not so generally as the bread-fruit.

The Maize or Indian corn, *Zé'a Mä'ys*, *Monoecia Triandria*, is a very useful plant. It is a native of America, and is cultivated in several other countries. The seeds grow in ears, which are very large, each of them bearing about eight rows of grain; and every row contains at least thirty grains, which give much more flour than those of wheat, or any of our kinds of corn. The stalk of the maize is jointed, like the sugar-cane and bamboo, and it contains a juice from which a syrup like that of sugar is often made.

The Sago Palm, *Sa'gus Rum'phii*, from the pith of which the substance called Sago is prepared, and the Cocoa-nut-tree, *Co'cos nucif'era*, both in *Monoecia Hexandria*, were originally natives of the East Indies, but have been introduced into several other warm countries. It thrives remarkably well on the sea-shore; indeed, the neighbourhood of the sea appears to be necessary to its growth; and M. de Humboldt, a celebrated traveller, mentions, that on the banks of the river Oronoco, when the cocoa-nut is planted, a quantity of salt is thrown into the hole along with it. The tree grows to the height of sixty feet, and has a fine appearance; the top of the stem being crowned with about fifty leaves, which are from ten

to fifteen feet long, with nuts nearly as large as a man's head hanging from it, in clusters of about a dozen each. You have often seen the inner shells of these nuts; which consist of a very hard case, and contain a thick coat of kernel of an agreeable flavour, and a sweet milky liquor. The hard cases are employed with us for making sugar-bowls, and various toys, and are very useful to the natives of the countries where the tree grows. A sort of wine, called Toddy, is made from the sap of the stem, which looks like whey.

EDWARD.

You told me yesterday, that the mat at the green-house door was made of part of the cocoa-nut. How can that be?

MOTHER.

In their natural state, the inner shells, which contain the kernel, are surrounded with a thick coat or crust of coarse fibres, which are employed for making mats, a purpose that they answer very well; and there is, besides, a smooth rind on the outside of the crust. The Indians make ropes of the bark of the tree, and use the leaves for making mats, baskets, and brooms.

The wood of the Cypress-tree, *Cupres'sus sempervi'rens*, *Monoecia Monadelphia*, is said to resist worms and moths remarkably, and to last for

many centuries. Some of the chests that contain the Egyptian mummies are made of it; and the coffins in which the Athenians buried their heroes were of cypress wood. The doors of Saint Peter's church at Rome were originally made of this timber, and when they were removed, at the end of six hundred years, in order to put gates of brass in their place, they did not show the slightest appearance of decay. In the island of Candia, where these trees grow in abundance, they are so valuable, that one of them is reckoned a daughter's portion.

The tree that produces the Indian rubber or Caoutchouc, which was first introduced into Europe about the beginning of the last century, is a native of the West Indies. This substance is an elastic resin, of very singular properties, which is deposited by a liquor that oozes out from incisions cut in the bark of a tree called *Jatropha elástica*, *Monocia Monadelphia*, and when fresh and pure, is of a whitish colour: but it becomes brown by exposure to the air. A gum of the same kind is procured from several other trees; among which is the Jaca-tree, that I have already mentioned to you. The Indians make boots of Caoutchouc, which are water-proof, and when smoked look like leather: the inhabitants of Quito, in South America, prepare from it a kind of cloth, which they use as we do oil-cloth and sail-cloth; and in

India, flambeaux are made of it, that burn without a wick, and are used by fishermen when they go out at night to fish: and of late, a very ingenious application of it has been invented, by a gentleman of Glasgow, for making cloth water-proof. — The Caoutchouc is dissolved in Naphtha, a brownish liquor obtained in the process for making gas for lamps from coal, so as to form a varnish, with which the surface of thin cloth, or silk, or calico, is covered. This alone would be sufficient to prevent the rain from penetrating; but as the varnish is very sticky, and would be inconvenient if it were exposed, it is covered up by a second thin cloth; and the whole is passed between rollers, which make it quite smooth, and of equal thickness all through. I have seen water-proof cloaks made in this manner, of double calico, or silk, with Indian rubber between, that are lighter than a single cloth of the common kind such as you wear.

EDWARD.

But will not the rain melt away the Indian rubber from between the folds of cloth?

MOTHER.

No; because it cannot be dissolved in water; — indeed, there are few liquors besides Naphtha that will dissolve it.

The Castor oil plant, or Palma Christi, Ric'inus *

* In this word the c is pronounced soft, like s.

commu'nis, and the Manchineel tree, *Hippoma'ne Mancinel'la*, belong to the order Monadelphia of this class.

The Tallow-tree, *Stillin'gia sebif'era*, Monoecia Monadelphia, is remarkable for the quantity and peculiar nature of the oil obtained from its berries; which so nearly resembles wax or spermaceti, that candles are made of it; but they produce a very disagreeable smell in burning. The tree is a native of China.—Castor oil is obtained from the seeds of the *Ric'inus commu'nis*, which are dried in the sun when ripe, pounded in wooden mortars, and then boiled in water. The oil rises to the surface of the water, and is skimmed off and put into jars for use. In this country it is employed only as a medicine; but in the West Indies the planters burn it in lamps, and apply it to various other purposes.—The seeds themselves of the *Ric'inus commu'nis* are an extremely powerful medicine.

The Manchineel is a very large West Indian tree, the wood of which is beautifully clouded, takes a fine polish, and is very durable. The Indians are said to poison their arrows with its juice, which is so very corrosive, that the wood-cutters make a fire round the tree before they cut it down, to cause the juice to run out, and avoid the danger of losing their sight by its flying into their eyes.

Besides these plants, the class Monoecia of Linnaeus contains some of the most valuable trees that

grow in England, either natives, or introduced from foreign countries; among which are the Oak, the Firs, Beech, Birch, and Mulberry: and the genus *Cucumis*, which includes the Melon and the common Cucumber, with several other species, also belongs to it.

In the twenty-second class, *DIOECIA*, [PLATE 2. fig. 22.] the stamens and pistils are in different flowers, and on separate plants; the orders in general depend upon the number of stamens.

This class, among other valuable species, contains the great Date-palm, the Pistachia-tree, Hemp, and the Nutmeg-tree; with several others that I have already mentioned to you, among the native plants.

The genus *Salix*, or Willow, is a very numerous one; containing about sixty native, and several foreign species. On some trees, all the flowers contain stamens only, two in each flower; and on others, a pistil only, with a divided summit, and a single seed-vessel close below. The flowers are collected, in both cases, into what are called Catkins, from their resemblance to the tail of a cat; each little flower having neither calyx nor petals, but being separated from the rest by a small scale. In the table of the classes [PLATE 2. Class 22.] you will see two such catkins as I describe, with a flower of each kind magnified. The common Osier, the twigs of which are so much used for mak-

ing baskets and bird cages, is a native species of *Sa'lix*, the *vim'inalis*.

The Date-palm, *Phœnix dactylif'era*, is a native of the Levant: it grows from sixty to a hundred feet in height, with a cluster of leaves, like branches, eight or nine feet long, springing from the top, spreading all round like an umbrella, and bending towards the ground. The shape of the fruit is something like that of an acorn. — There is scarcely any part of the Date-tree that is not useful. It supplies the place of corn to the inhabitants of the countries where it grows, and furnishes them with almost the whole of their subsistence. Besides the fruit, they eat the young leaves; and of the old ones they make mats, and many other articles, with which they carry on a considerable trade. The tree, when wounded, affords a white juice, called by the natives the milk of the date; which has a sweet and agreeable taste, and is given to invalids as a refreshment: and even the stones of the fruit, though very hard, are not thrown away, for when bruised or softened in water, they are given to sheep and camels as food.

The Pistachia-nut-tree, *Pista'cia Terebin'thus*, *Dioecia Pentandria*, grows naturally in Arabia, Persia, and Syria, from whence the nuts are brought to Europe. I will show you some of them after dinner; they contain a kernel of a pale greenish colour, with a pleasant flavour. The *Mas'tich-*

tree is another species of *Pista'cia*, the *Lentis'cus*; it affords the resinous substance called *Mas'tich*, which is sometimes employed in medicine, and in making varnish; the Turkish women use it to whiten their teeth.

You have often heard of Hemp, which is obtained from a plant that is cultivated in many parts of England, particularly in Lincolnshire and Suffolk, but is a native of India: the botanical name is *Can'nabis sati'va*, *Dioecia Pentandria*.

EDWARD.

Is it not hemp that ropes are made of?

MOTHER.

It is; and sail-cloth also; and the seeds yield a great quantity of oil. The whole plant, when fresh, has a disagreeable smell; and the water, in which the stalks are soaked, for the purpose of separating the tough rind or outer coating, becomes poisonous.

The Nutmeg-tree, *Myris'tica moscha'ta*, is very beautiful, and grows abundantly in the East Indies. The leaves have a very fragrant smell, as well as the fruit, which is about the size of a nectarine, and consists of three coats: — the first a fleshy pulp; the second a coloured membrane, which is the spice called mace; and the third, a shell, containing within it the nutmeg, which is the seed of the

plant. In India, the nutmeg-fruit, preserved entire, is introduced with tea, but the pulp and mace only are eaten.

The plants of the twenty-third class, Polygamia [PLATE 2. fig. 23.], bear flowers of three different kinds; with stamens only, or with pistils, or with both; and these grow either on the same plant, on two distinct ones, or on three. But several good botanists think this class unnecessary, since very few plants have these characters. The only species belonging to it, that I recollect, are the Plantain-tree, the Sensitive-plant, and the Fig.

The fruit of the Plantain-tree, *Musa paradisiaca*, is one of the greatest blessings the inhabitants of hot climates enjoy. It is cultivated in all the West Indian islands, where the plantains serve the negroes instead of bread. The tree rises with a soft stalk fifteen or twenty feet high; and the leaves, which are often eight feet long, come out from the top on every side. The fruit, or plantain, is about a foot long, and from three to six inches round; it has a tough skin; and, within, a soft pulp of a very sweet flavour, which is roasted and eaten. Every part of the tree is applied to some useful purpose in the West Indies.

The Sensitive-plant, *Mimosa pudica*, which you have seen in the hot-house, is a native of Brazil; and belongs to a genus, several species of which have the singular property of moving their

leaves or branches when touched: but they do not move of themselves, like the *Hedys'arum gy'rans*.* From the *Mimo'sa Nilot'ica*, a tree that grows abundantly on the sandy soil of Arabia and Egypt, and several parts of Africa, Gum-Ar'abic is procured; of which the purest sort is brought to Cairo, by the Arabs of the country round Mount Tor and Sinai, who convey it across the country, sewed up in bags of skin, on the backs of camels. It is so nutritious that a whole caravan has subsisted upon it during a journey over the deserts of Arabia, each person being allowed six or eight ounces a day.

The common Fig, *Fi'cus Car'ica*, is a native of the south of Europe. What we consider as the fruit, is called by Linnæus the receptacle, or common calyx, of the flowers; and he describes it as being top-shaped, fleshy, closed at the broad end, with several scales, and having the inside covered with little flowers, both perfect and imperfect, sometimes in the same fruit, and sometimes on different trees. — In most cases it is the flower that contains the young fruit; but in this plant the fruit encloses and conceals the flower.

It was a long time before it was known how the fig is propagated; and the history of this tree is so very curious, that at some future time you shall read an account of it.

* See page 196.



Fern



Moss



Lichen



Sea Weed



Mushroom

Class XXIV. CRYPTOGRAMIA.

Sewarby sc.

CONVERSATION THE EIGHTEENTH.

CLASS 24. CRYPTOGAMIA. — ORDERS. — FERNS. —
 MOSSES; THEIR VARIOUS USES. — LICHENS. — REIN-
 DEER MOSS OR LICHEN. — SEA-WEEDS. — MUSHROOMS.

MOTHER.

THE plants of the twenty-fourth class, Cryptogamia, are so very different from those of all the other classes, that the study of them may be considered as forming a distinct department of botany; and I do not recommend them to your particular attention, unless hereafter you wish to devote a large portion of your time to this subject. There are several books well calculated to assist your progress, whenever you are disposed to pursue it: and you will be equally astonished and pleased at the wonderful regularity and minuteness of the parts of these plants, and the beautiful contrivances of nature for their nourishment and distribution.

The character of this class consists, as I have already told you, in the plants that compose it having flowers, of which the stamens and pistils are either not well ascertained, or not to be numbered

with certainty; so that they cannot be referred to any of the preceding classes.*

The orders into which the class is now divided are five; consisting of tribes quite different from each other in their characters and appearance.

The first is called Fil'ices, or ferns; the second, Mus'ci, or mosses, includes a great many genera and species; the third, Hepat'icæ, or liverworts, consists of genera, bearing some resemblance to the mosses; the fourth, called Al'gæ, comprehends the lichens and sea-weeds; and the fifth, Fun'gi, contains all the mushrooms and funguses. Withering, and some other botanists, have another order besides, which they call miscellaneous, including plants that are not easily referred to any of the tribes I have just mentioned. The drawing that I have made for you [see PLATE 21.] is intended merely to show the general appearance of some of the most common cryptogamic genera, in each order.

The FERNS, in general, have what is called their fruit disposed in spots or lines upon the under side of the leaves; and the genera are distinguished, principally, by the shape and structure of these spots. They are a beautiful tribe; but the uses to which they are applied are not very numerous.

Several of our common kinds of fern are em-

* Smith's Introduction, &c. p. 321.

ployed as firing by the poorer classes of people; who also mix the ashes with water, and form them into balls, which they dry in the sun, and use instead of soap for washing their linen.

The leaves of most of the species, if cut when fully grown and properly dried, make a thatch for houses more durable than any sort of straw; and the root of one kind, called the Flowering Fern, *Osmun'da rega'lis*, when boiled in water, is employed in the north of Europe, like starch, to stiffen linen.

Humboldt tells us, that at Santa Maria, one of the Azores, almost all the plants of the fern tribe assume the form and magnitude of trees. In the time of Linnæus, botanists were acquainted with only four of these arborescent species; but five new ones have been discovered in Santa Maria alone.

In South America, also, some ferns, not unlike our common Brakes or Polypody, *Pte'ris aquilí'na*, grow to such a size, that they may be compared to trees; and at the southern extremity of Van Diemen's island a species has been found, whose trunk attained a height of from twelve to sixteen feet; it is remarkable that no fern of this description has been discovered beyond the northern tropic. There is one species found in North America, called the Sensitive Fern, *Onoc'lea sensib'ilis*, which is said to wither immediately on being

touched by the human hand, but to endure the touch of other bodies without injury. Sprengel, a German botanist, asserts that he repeated this experiment several times, and always with the same effect.

The MOSSES, which form the second order of the class Cryptogamia, have roots and leaves something like those of other plants; but the fruit is very different. Small threads, like the filaments of stamens, generally grow out of the bosom of the leaves, and support little roundish bodies, that resemble anthers, but which are really the capsules that contain the seeds. These capsules are hollow, of various figures, and in general furnished with what is called a Calyptra, or Veil, like a little extinguisher: and when this is removed, the mouth of the capsule itself, which sometimes has a Lid besides, is found to be surrounded with one or two rows of fringe, of great delicacy, and of surprising regularity in the number of the teeth that compose it. The genera of mosses are founded chiefly upon the situation of the capsule, and some other circumstances; among which the structure of the fringe at the mouth is the most important. The form of the leaves of mosses is extremely simple; they are all destitute of leaf-stalks, and are never either winged or divided.

The mosses are generally perennial and evergreen, and capable of growing in much colder

climates and situations than most other vegetables. I have heard, that in the dreary country of Spitzbergen the rocks, which rise out of everlasting masses of ice, are thickly clothed with mosses; and a botanist, named Crantz, who travelled in Greenland, counted above twenty different species, without moving from a rock where he was seated. — They possess the singular property of reviving when moistened, after having become very dry and to all appearance withered; and even after they have been gathered and kept in a dry state for many years, if put into water, every part of them will expand, and become apparently as fresh as when they were growing. They overspread the trunks and roots of trees, and in winter defend them against frost; in wet weather they preserve them from decay, and, during the greatest drought, provide them with moisture, and protect them from the burning heat of the sun. It has been observed, too, that mosses grow chiefly on the northern side of the trunks and branches of trees, as if to shelter them from the cold north wind.

The poor Laplanders derive several of their comforts from the mosses. Of the Golden Maiden-hair, *Polytrichum commune*, one of the largest species belonging to this tribe, they form excellent beds, by cutting thick layers of it, one of which serves as a mattress, and the other as a coverlet: and Lin-

næus tells us, that he himself often made use of such a bed, when he was travelling in Lapland. These mossy cushions are very elastic; so that a bed may be rolled up into a parcel small enough to be carried under a man's arm, and the inhabitants can easily take them about with them in their journeys. They do not grow hard by pressure; and when they lose a part of their elasticity by long use, it can soon be restored by dipping them in water.

The Lapland women make great use of the grey Bog-moss, *Sphagnum palus'tre*, which is particularly soft, like a thick fur or fleece. They wrap their infants up in it without any other clothing, and place them in leathern cradles, lined with the moss; and in these soft and warm nests the little babies are completely defended from the cold. The Greenlanders use this moss as tinder, and for wicks to their lamps.

There is a plant of another genus in this class, *Lycopodium clava'tum*, which, though not belonging to the same order, is called Club-moss: the seeds of it are collected and sold in various parts of Europe, for the purpose of producing the appearance of lightning on the stage at theatres; for being very light and combustible, they take fire very quickly, and with a sort of hissing noise, while floating in the air.

The structure of the mosses is so beautiful, that

they are objects of the greatest interest and admiration, to all who understand them. Mungo Park, a traveller, celebrated for his fortitude and courage, who ventured alone into the midst of the great unknown countries of Africa, wrote an account of his journey that will give you pleasure at some future time; and I will now read you a part of it. — “ I saw myself in the midst of a vast wilderness, naked and alone, surrounded by savage animals, and by men still more savage. I was five hundred miles from the nearest European settlement; I considered my fate as certain, and that I had no alternative but to lie down and perish. At this moment, the extraordinary beauty of a small moss irresistibly caught my eye; and though the whole plant was not larger than the top of one of my fingers, I could not contemplate the delicate conformation of its roots, leaves, and capsules, without admiration. Can that Being, thought I, who planted, watered, and brought to perfection, in this obscure part of the world, a thing which appears of so small importance, look with unconcern upon the situation and sufferings of creatures formed after his own image? — Reflections like these would not allow me to despair: I started up, and, disregarding both hunger and fatigue, travelled forwards, assured that relief was at hand; and I was not disappointed.”

EDWARD.

And did he ever come home?

MOTHER.

He did, my dear; but he went out again to Africa, to make new discoveries, and was killed by some of the natives.

The HEPAT'ICÆ, or Liverworts, form the next order of Cryptogamic plants: they are a tribe of small herbaceous plants resembling the mosses; the name is derived from a Greek word signifying the liver, perhaps because some of them were formerly employed to cure diseases of the liver, or from their supposed resemblance to the lobes or divisions of the liver.

The AL'GÆ consist of plants, some of which are formed of a mere crust, others of a leathery or jelly-like substance; and there are two principal divisions, — the Li'chens — and the Aquatic, or Submersed Al'gæ, some of which abound in fresh water, others in the sea. The latter are commonly called Sea-weeds; and the genera, in both divisions of the order, are distinguished, either by the situation of what is supposed to be the flower or seed, or by the resemblance of the whole plant to some other well-known substance.

The nearer we approach either to the north or south pole, the more we find the earth abound

with lichens and liverworts; and in advancing towards the equator, the class of plants next in abundance are the mosses; then the grasses.

Li'chens commonly grow in fleshy or leather-like patches, on the stems of trees, rocks, old buildings, palings, and other solid bodies. —

EDWARD.

Are those lichens, that grow, like rough yellow and bluish crusts, upon the old gooseberry-bushes and apple-trees in the garden? I think your drawing is like them.

MOTHER.

They are some of the most common species. — The lichens, as well as the mosses, are found to thrive in all kinds of soil, and in every climate: and, like the mosses, they have the property of growing again, when placed in situations adapted to them, though they may have been kept in a dry state for many years. They are not destroyed either by heat or severe cold, and are found growing where no other vegetation is to be seen.

One species of this tribe of plants, the Li'chen rangiferi'nus, or Rein-deer Moss, is the most useful vegetable that grows throughout the whole of Lapland; for it is the principal food of the reindeer, without which valuable creature, the inhabitants of that miserable country could scarcely exist.

The rein-deer draws them in sledges over countries buried in snow; its flesh and milk afford them nourishment, its skin clothing, and even its bones and sinews are made into several useful articles.

The Rein-deer Li'chen, or Moss, as it is sometimes called, is of a whitish colour, and grows in Lapland to the height of at least a foot, covering the ground like snow; but in this country, where it is found in some mountainous situations, it seldom attains the height of six inches.

The inhabitants of Iceland find another species of lichen, called Iceland-moss, Li'chen Islan'dicus, which grows abundantly in that country, highly serviceable: they make use of it as food in various ways, and consider it as very nourishing.

Several different species of lichen afford beautiful dyes; and one of them, called Dyer's-li'chen, or Orchall, Li'chen roccel'la, is particularly valuable, from its communicating to wool and silk various shades of purple and crimson. This plant, which is brought chiefly from the Archipelago and the Canary Islands, is of great importance as an article of commerce; and when scarce, has been sold for even a thousand pounds a ton.

The purple powder, called Cudbear, that is used in dyeing purple, is prepared from the Li'chen tar-ta'reus, which is common in many parts of England; but it can be used only for dyeing woollen cloth, as it does not communicate its colour to vegetable substances.

The Aquatic Algæ, including the sea-weeds, imbibe all their nourishment through their surface, the roots serving only to fasten them to the bottom; and many of them float about in the water, without being attached to any solid body. They constitute a very large tribe.

Of the Sea-weeds, some are used as food, and all are of great importance to the farmers on the sea-coast, for manuring their land. In the islands of Jura and Skye, the Bladder-fu'cus, or Sea-wrack, *Fu'cus vesiculo'sus*, often serves as winter-food for the cattle, which regularly go down to the shores, when the tide is out, to eat it; and even the deer have been observed to come from the mountains to feed upon this plant. Linnæus says, that the inhabitants of Gothland in Sweden boil this fu'cus in water, and feed their hogs with it, mixed with meal: in Scandinavia, the poor people thatch their cottages with it. But one of the most important purposes to which this sea-weed is applied, in common with many other species, is the preparation of kelp, a kind of salt, which is a principal ingredient in the manufacture of soap.

If the leaves of this plant receive a wound, while growing, abundance of young shoots are thrown out from the injured part; and even if a hole or rent be made in the middle of a leaf, a new one will spring from each side of it.

In Scotland, the Sea-tangle, *Fu'cus digita'tus*, as

well as the Dulse, *Fucus palma'tus*, is employed as food; and the stems of the former plant are sometimes used for making handles of knives. For this purpose a thick stem is chosen, and cut into pieces about four inches long; the hilts of the knives are stuck into these while fresh, and, as the stem dries, it contracts and hardens firmly around them. These handles, when tipped with metal, can scarcely be distinguished from horn. The large stalks of the plant are dried, and used as fuel in the Orkney and Shetland Islands.

The size that some of the larger kinds of seaweeds attain, and the rapidity of their growth, are truly wonderful. The Gigantic *Fucus*, *Fucus gigante'us*, is said to extend often to the length of a thousand or fifteen hundred feet: and it grows in such profusion, that the masses of it resemble islands. In the Atlantic, Pacific, and Indian Oceans, there are vast tracts of sea-weeds; one of which has been called by navigators the grassy sea, from its great extent. The entire surface in such places is literally covered with these plants; and ships on their voyages are several days in passing through them.

The *Fucus te'nax* is employed in China as glue and gum-arabic are with us: when washed and steeped in warm water it dissolves, and as it cools stiffens into a glue, with which large sheets of paper are coated, in order to make them transparent; and these are used, instead of glass, for lanterns and

windows. In China, too, windows are sometimes made of slips of bamboo which are crossed, and the spaces between are filled up with thin sheets of this glue alone.

The *Fu'cus lichenöi'des* is in high estimation in the East Indies, particularly at Ceylon, as a luxury for the table.—You will be surprised to hear that the nests of a kind of swallow are eaten as a delicacy in China, and throughout the East, and even imported to London. These nests, it is supposed, are made by the birds almost entirely of the *Fu'cus lichenöi'des*.

The little branch of sea-weed that I have sketched for you [PLATE 21.], does not resemble any of the kinds which I have been speaking of. It is a species of the genus *Confer'va*; and I have drawn it merely to give you an idea of the difference between the Aquatic Algæ and the Li'chens, which form the two divisions of the order Algæ. Several species of *confer'va* are found to be very beautiful and curious, when examined with a magnifying glass.

The FUN'GI are a very singular tribe: they have, properly, no leaves; their whole substance being fleshy, generally of quick growth and short duration, and of various degrees of firmness, from a watery pulp to a leathery or even woody texture. Several of the species are poisonous. What is called the dry-rot in wood is a decay supposed to be occasioned by a peculiar kind of fungus, that

destroys the wood to which it adheres, and from which it derives its nourishment.

The only kind of fungus that we venture to eat is the *Agar'icus campes'tris*, or common Mushroom; which is often cultivated in hot-beds, and grows wild in parks and fields, that have been undisturbed by ploughing for many years together. The most splendid of all the mushrooms, *Agar'icus xerampeli'nus*, is common in Italy, and is brought to the markets there for sale as food; but it is very rarely found in England. It is of a beautiful red and orange colour. But the *Agar'icus delicio'sus*, which also grows in Italy, and has been found in England, is of much superior flavour, and was highly prized as a luxury by the ancient Romans.

In Lapland, Linnæus saw the *Bole'tus igni-a'rius*, another kind of mushroom, which is shaped like a horse's hoof, hung up on the walls of the cottages, and used as a pincushion. It is made use of also as tinder in some parts of England and Germany.

I have now told you, my dear Edward, all that I intended to mention about Botany; and I hope that what you have already learned will enable you to make use of books, upon this interesting subject, without my assistance. I shall be very much gratified, if your desire to pursue it is at all increased by any thing that I have said.

EXPLANATION
OF
THE BOTANICAL TERMS

MADE USE OF IN THIS VOLUME.

AGGREGATE; a term applied to flowers which consist of several florets placed upon one receptacle, and included within one common calyx, but the anthers not united; as the scabius and teasel, in the class Tetrandria.

ALTERNATE, branches, leaves, or flowers; — coming out regularly one above another, but on different sides; not opposite.

ANGIOSPERMIA; the name of one of the orders of the class Didynamia; in which the seeds are enclosed in a seed-vessel.

ANNUAL, plants or roots; living only one year.

AN'THER; the uppermost part of a Stamen, fixed upon the top of the filament, and containing the Pollen.

ARBORES'CENT, stem, — distinguished from herbaceous, — becoming woody.

ARROW-SHAPED; like the head of an arrow: as the leaves of common sorrel, or the anther of the crocus.
[Plate 4.]

AWL-SHAPED; slender, and becoming fine towards the

end, like an awl; as the filaments of the flowering rush. [Plate 10.]

AWN; a slender, stiff, sharp substance, growing from the husks of some grasses and other flowers; as in oats, barley, and the teasel.

B

BARK; the outermost covering of the roots, stems, and branches of vegetables. It is generally divided into three parts; the cuticle or skin, the outer, and the inner bark.

BERRY; a pulpy seed-vessel, without valves; in which the seeds are surrounded with the pulp: as in the gooseberry; and the common holly. [Plate 6.]

BIENNIAL; living two years, and then perishing. In biennial plants, a root and leaves are formed during the first year, and the flower and fruit are completed in the second.

BLOSSOM, Corolla; that part of a flower which, in general, is coloured, and consists of one or more petals. [Plate 1.]

BORDER; the upper spreading part of a blossom of one petal: as in the germander-speedwell. [Plate 3.]

BRISTLES; strong, stiff, roundish hairs.

BULB; } the part, commonly round and fleshy,

BULBOUS-ROOT; } from which the stem of some plants arises, and which sends down fibres into the ground.

— The fibres are the true root. A bulbous-root is either solid, as in the crocus and snow-drop — [Plates 4. and 8.] — coated, as in the onion, — or scaly, as in the lily.

BULGING; swelling out irregularly; as the two outer leaves in the calyx of the wall-flower. [Plates 1. and 16.]

BUNCH; a fruit-stalk, or flower-stalk, furnished with short branches at the sides. The white and red currants grow in bunches; as also the flowers of germander-speedwell. [Plate 3.]

C

CADU'COUS; from cado, to fall; falling off quickly. The poppy affords an example of the caducous calyx. This term is also applied to stipules, leaves, and petals.

CA'LYX; that part of a flower which, in general, grows close under the corolla. There are seven different kinds of calyx; but the following only are mentioned in this volume, viz. —

A Cup, as in the corn-cockle and ground-ivy. [Plates 11. and 15.]

An Involu'crum, as in the flowering-rush. [Plate 10.]

A Catkin, as in the willow. [Plate 2. Class Dioecia.]

A Sheath, as in the crocus and snow-drop. [Plates 4. and 8.]

A Veil, as in the mosses. [Plate 21.]

CAPSULE; a dry hollow seed-vessel, which opens naturally, when the seeds are ripe, to let them out: as in the poppy. [Plate 14.]

CATKIN; a composition of flowers and chaff, upon a long, slender, thread-shaped receptacle; the whole resembling the tail of a cat: as in the common willow. [Plate 2. Class Dioecia.]

- CELL**, a hollow space in a seed-vessel, particularly in a capsule, for holding the seed.
- CENTRE-FLORETS**; those which occupy the middle part of a compound flower; as the yellow ones in the daisy. [Plate 20.] — See **FLORET**.
- CIRCUMFERENCE**; the outward line or boundary of a circle. The word is used, in speaking of compound flowers, to express the florets that are farthest from the centre; as the white ones, which surround the yellow, in the daisy. [Plate 20.]
- CLAW**; the lower part of the petal, which stands within the calyx, in a polypetalous flower: as in the wall-flower and corn-cockle. [Plates 1. and 11.]
- CLIMBERS**; plants which are weak, and require the support of some other body to raise themselves upon; as the ivy and vine. Climbers do not twine round the bodies to which they are attached.
- CLOVEN**; divided or split, the edges of the divisions being straight: as the summit of the pistil in ground-ivy. [Plate 15.] — See **NOTCHED**.
- COATED**; composed of layers, one over another; like an onion.
- COLOURED**; of any other colour than green. The calyx is sometimes coloured.
- COMMON**; applied to the calyx; — containing several blossoms: as in plants of the class Syngenesia, dandelion, thistle, daisy, &c. [Plate 20.]
- COMPOUND**; a term applied to the flowers of the class Syngenesia; which consist of many florets, or little flowers, placed upon one receptacle, and included within one common calyx, — with the anthers united: as the daisy. [Plate 20.]

COMPRESSED; flattened on the sides.

CONE, strobile; a solid body shaped like a sugar-loaf,
— The fruit of the fir, and of several other trees, is called a cone, because it has this shape.

CON'ICAL; shaped like a cone or sugar-loaf; as the receptacle of the daisy. [Plate 20.]

COTYL'EDON; a seed-lobe, destined to nourish the heart of the seed, and then to perish.

CREEPING; extending itself along or under the ground, and putting forth roots or fibres; applied to stems and roots.

CROSS-SHAPED FLOWERS, are those which have four equal petals, spreading out in the form of a cross; as the wall-flower. Plates 1. and 16.]

CRU'CIFORM; cross-shaped.

CRYPTOGA'MIA; the name given by Linnæus to the twenty-fourth class: stamens and pistils not visible to the naked eye, or not ascertained. [Plates 2. and 21.]

CUP; a kind of calyx; so called because it is commonly shaped like a cup. It is either of one leaf, as in mouse-ear and corn cockle [Plates 7. and 11.]; or formed of several leaves, as in wall-flower, [Plates 1. and 16.]: and is sometimes double, as in mallow, [Plate 17.] And it contains either one flower, as in the examples above mentioned, — or several, as in the daisy. [Plate 20.]

D

DECAN'DRIA; the name of the tenth class; ten stamens in each flower. [Plates 2. and 11.]

DECID'UOUS leaf; falling off in the autumn. This term

is also applied to the calyx, corolla, legumen, and stipula.

DECUMBENT; applied to the stalk, lying upon the ground, or near it.

DIADEL'PHIA; the name of the seventeenth class: filaments united in two sets; flowers butterfly-shaped. [Plates 2. and 18.]

DIAN'DRIA; the name of the second class; two stamens in each flower: as germander-speedwell. [Plates 2. and 3.]—Also the name of an order, in the classes Gynandria, Monoecia, and Dioecia.

DIDYNA'MIA; the name of the fourteenth class; four stamens in each flower, two of them long, and two short. [Plates 2. and 15.]

DIGYN'IA; the name of one of the orders in each of the first thirteen classes, except the ninth and twelfth; — two pistils in each flower.

DIOE'CIA; the name of the twenty-second class; the flowers which contain stamens growing on distinct plants from those with pistils. [Plate 2.]—Also the name of one of the orders in the class Polygamia.

DIPHYL'LOUS, or two-leaved, calyx; as in the poppy. [Plate 14.]

DODECAGYN'IA; the name of one of the orders in the eleventh class; twelve, to eighteen or twenty pistils in each flower. [Plate 12.]

DODECAN'DRIA; the name of the eleventh class; from eleven to nineteen stamens in each flower. [Plates 2. and 12.]

DOUBLE; — a flower is commonly so called, when the petals exceed the usual number, while some of the stamens remain. See **FULL**.

DOUBLE-calyx; one calyx within another, as in the mallow. [Plate 17.]

DOWN; the fine hair, or feather-like substance, with which the seeds of some plants are furnished; as in the dandelion and several other compound flowers. [Wood-cut, page 208.]

E

ENNEAN'DRIA; the name of the ninth class; nine stamens in each flower, [Plates 2. and 10.]—And also of one of the orders in the classes Monadelphia and Dioecia.

EVERGREEN; bearing green leaves throughout all seasons of the year: as the common holly.

F

FARI'NA; the pollen.

FEATHERED; — applied to hair, bristles, or down having smaller hairs growing on the sides. The down of seeds sometimes consists of simple hairs: sometimes it is feathered, — as in dandelion. [Wood-cut, page 208.]

FERNS, Filices; the name of a natural tribe of plants, which form one of the orders of the class Cryptogamia. [Plates 2. and 21.]

FIL'AMENT; that part of a stamen which supports the anther. [Plate 1.]

FIL'ICES; ferns.

FLESHY; of a consistence more solid than pulp: as the fruit of the apple, the fruit of the turnip, and the leaves of some plants. The soft part of a cherry or gooseberry is called pulpy.

- FLO'RET** ; a little flower ; one of those which constitute a compound flower : as in the daisy. [Plate 20.]
- FLOWER** ; that part of a plant which produces the seed.
- FRUIT** ; the seed or seeds, with their seed-vessel ; — but the seed is the essential part.
- FRUIT-STALK** ; a stem or branch bearing fruit or flowers, but not leaves. [Plates 3. 10., &c.]
- FULL** ; this term is applied to the flowers, commonly called double, when by richness of soil, or other causes, all the stamens have been changed into petals. Full flowers cannot produce seeds.
- FUN'GI** ;* funguses, mushrooms ; the name of one of the orders in the class Cryptogamia. [Plate 21.]
- FUNNEL-SHAPED** ; applied to a blossom of one petal, with a lower part like a tube, and the upper like a cup : as in the mezereon. [Plate 9.]

G

- GAPING** ; a term applied to the blossoms of several plants, in the class Didynamia, from their resemblance to an open mouth : as ground ivy. [Plate 15.]
- GELAT'INOUS** ; like jelly.
- GEN'ERA** ; plural of the word genus.
- GE'NUS** ; one of the subdivisions in the systematical arrangement of plants ; containing those, of the same classes and orders, which agree in their flowers and fruit.
- GERMEN** ; the lower part of a pistil. — It is the young fruit, scarcely formed ; and becomes afterwards a seed-vessel, capsule, pod, or legumen, &c. [Plate 1.] — The germen is sometimes placed below the calyx

* In this word the G is pronounced soft, like J.

and corolla, sometimes above or within them. See SUPERIOR.

GLANDS; solid bodies, differently situated in different plants, which afford a peculiar fluid: as in the wall-flower, where they are placed at the foot of the shorter stamens. [Plate 1.]

GRAM'INA; { a natural family of plants; comprehend-
GRASSES; { ing those in the order Digynia, of the
class Triandria.

GRINNING; see RINGENT.

GYMNOSPER'MIA; the name of one of the orders of the class Didynamia; in which the seeds have no covering: as in the ground-ivy. [Plate 15.]

GYNAN'DRIA; the name of the twentieth class; stamens growing upon the pistils. The flowers of this class have a very peculiar structure; as in the Orchises. [Plate 2.]

H

HEADS of flowers; when several flowers grow thickly together in a kind of ball, they are said to form Heads; as in the common red and white clover, and the bird's foot clover. [Plate 18.]

HEART-SHAPED; a term applied to some leaves and petals, from their resemblance to the shape of a heart. — When the narrow end is next the stem, the term is 'inversely heart-shaped:' as the petals of the Mallow. [Plate 17.]

HEPTAGYN'IA; the name of one of the orders in the seventh class.

HEPTAN'DRIA; the name of the seventh class; seven stamens in each flower. [See Plate 2.]

HERB; or **HERBA'CEOUS PLANT**, opposed to woody; terms applied to plants that are succulent and tender. — The mouse-ear, and common garden pea, are herbs; the stem of the wall-flower is somewhat woody; the mezereon is a shrub; the ash, oak, &c. are trees.

HEXAGYN'IA; the name of one of the orders in the sixth, ninth, and thirteenth classes; in which each flower has six pistils: as in the flowering-rush. [Plate 10.]

HEXAN'DRIA; the name of the sixth class; six stamens in each flower. [Plates 2. and 8.]

HUSK; the calyx and blossom of the grasses are called husks: they are thin and dry, like chaff; consisting of one or more leaves, called valves, with or without awns; and containing the grain or seed. [Plate 5.]

I

ICOSAN'DRIA; the name of the twelfth class; twenty stamens or more, fixed to the calyx. [Plates 2. and 13.]

IMPERFECT FLOWER; wanting either stamens or pistils, or both; as in the classes Monoecia and Dioecia. [Plate 2.] The florets of the border in the daisy are imperfect; having no stamens. [Plate 20.] — A flower that wants the calyx or corolla, is not called Imperfect, but Incomplete; as the mezereon. [Plate 9.]

INFERIOR; applied, principally, to the germen, when it is placed below the cup; as in the snow-drop. [Plate 8.]

INVOLUCRUM; a sort of calyx distant from the corolla; exemplified principally, but not exclusively, in umbelliferous plants. The calyx in the flowering rush is an involucre. [Plate 10.]

J

JOINTED STEM; one that has knots, or joints: like the straw of wheat, &c. [Plate 5.]

K

KEEL; the lowermost petal in a butterfly-shaped blossom; so called from its resemblance to the keel of a boat. [Plate 18.]

KNOTS; the joints of the stem of grasses and reeds. [Plate 5.]

L

LABIATE, or lipped; applied to a corolla of an irregular figure, with two lips: as in several flowers of the class Didynamia. [Plate 15.]

LEAFIT, or **LEAFLET**; $\left\{ \begin{array}{l} \text{one of the smaller leaves, in a leaf com-} \\ \text{posed of many; as in the dog-rose.} \\ \text{[Plate 13.]} \end{array} \right.$

LEAF-STALK; the stalk which supports a leaf, but not a flower.

LEGUMEN; a seed-vessel of two valves, in which the seeds are fixed to one seam only: as in the common pea. [Wood-cut, page 192.]

LEGUMINOUS PLANTS; those in which the seed-vessel is a legumen: as the bird's-foot clover. [Plate 18.]

LID; the cover of the capsule in several of the mosses. [Plate 21.]

LIPS; the upper and under divisions of a labiate or gaping blossom. [Plate 15.]

M

MONADEL'PHIA; the name of the sixteenth class; all the filaments united in a tube round the pistil. [Plates 2. and 17.]

MONAN'DRIA; the name of the first class; one stamen in each flower. [Plate 2.]

MONOE'CIA; the name of the twenty-first class; stamens and pistils in separate flowers, but on the same plant. [Plate 2.] — Also the name of one of the orders in the twenty-third class, Polygamia, of Linnæus.

MONOGYN'IA; the name of the first order in each of the first thirteen classes; one pistil in each flower.

MONOPET'ALOUS; a blossom is so called, when it is composed of only one petal: — as in germander speedwell [Plate 3.]; crocus [Plate 4.]; mezeion [Plate 9.]; ground ivy [Plate 15.]

MONOPHYL'LOUS; a calyx is so called when it is composed of one piece: the calyx of the primrose and of the corn-cockle are good examples. [Plate 11.]

MOSSES, Mus'ci; a natural tribe of plants, forming one of the orders in the class Cryptogamia.

MOUTH; the opening of the tube, in blossoms composed of one petal: as in mouse-ear [Plate 7.]; and ground-ivy [Plate 15.]

MUS'CI; Mosses.

MUSHROOMS, Fungi; the name of a natural tribe of plants, forming one of the orders in the class Cryptogamia. [Plate 21.]

N

NAMES. The botanical names of plants are, in every case, two ; — the Generic, which applies to all those of the same Genus ; and what is called the Trivial name, which is confined to those of one Species only. Whenever a third name occurs, it denotes a Variety. — Thus, *Gera'nium-malvifo'lium-pusil'lum* signifies a very small variety of the *Gera'nium-malvifo'lium*, or mallow-leaved Geranium.

NATURAL ORDER or CLASS ; an assemblage of several genera of plants, which agree in their general appearance and qualities : as the umbelliferous and leguminous tribes, the grasses, &c.

NECTARY ; a part of a flower, in which honey is supposed to be formed or contained ; of various forms in different flowers. [Plate 1.]

NODDING ; a term applied to a flower, when its stalk is bent down near the end : as in the daffodil, hyacinth, and snowdrop. [Plate 7.]

NOTCHED, at the end or sides ; having angular incisions, but not so deep as when cloven : like the summits of the pistils in the flowering rush. [Plate 10.]

NUT ; a seed enclosed by a hard woody shell : as the common hazel-nut ; and the kernel or stone of the peach, plum, and cherry, &c.

O

OCTAN'DRIA ; the name of the eighth class : eight stamens in each flower. [Plates 2. and 9.]

OPPOSITE ; leaves or branches ; — growing in pairs from the same part of the stem, but on opposite sides : as in the germander-speedwell. [Plate 3.]

P

- PAPILIONA'CEOUS** ; butterfly-shaped : — some blossoms are so called from their resemblance to a butterfly, in Latin Papil'io. The term is applied to plants of the class Diadelphia. [Plates 2. and 18.]
- PARASITICAL** ; growing upon some other plant, not in the ground : as the misletoe.
- PENTAGYN'IA** ; the name of one of the orders in the fifth, tenth, eleventh, twelfth, and thirteenth classes : five pistils in each flower.
- PENTAN'DRIA** ; the name of the fifth class ; five stamens in each flower. [Plates 2. and 7.]
- PERENNIAL** ; lasting for many years, or at least more than two.
- PERFECT FLOWER** ; having both stamens and pistils. — See IMPERFECT.
- PERMANENT** ; applied principally to the calyx ; — remaining on the plant after the fruit is ripe ; as in the mouse-ear [Plate 7.] and ground-ivy [Plate 15.]
- PET'ALS** ; the leaves which constitute the blossom, or corolla, of a flower. They are generally coloured [Plate 1.]
- PILLAR** ; a little shaft, or stem, supporting part of the down of some seeds : as in dandelion [Wood-cut, page 206.] The term is applied also to the receptacle, around which the capsules are placed, in the mallow. [Plate 17.]
- PISTIL** ; part of a flower ; — composed of the germen, style, and summit. [Plate 1.]
- PITH** ; a soft spongy substance, which clothes the inner surface of the hollow trunk of some plants : as in the rush and elder.

PLU'MULA ; the plume or ascending part of the coraculum or heart of the seed.

Pod ; a seed vessel, composed of two valves or shells ; with a partition, upon which the seeds are placed, being fixed, alternately, to each of the seams or sides. [Plate 16. and Wood-cut, page 192.]

POL'LEN, or FARI'NA ; a fine powder contained in the anthers of flowers.

POLYADEL'PHIA ; the name of the eighteenth class ; stamens united, by the filaments, in three or more sets. [Plates 2. and 19.]

POLYAN'DRIA ; the name of the thirteenth class ; more than twenty stamens, fixed to the receptacle. [Plates 2. and 14.]

POLYGA'MIA ; the name of the twenty-third class of Linnaeus ; three different sorts of flowers, on the same, or on separate plants ; some of them containing pistils, some stamens, and others both. [Plate 2.] The term is applied also to each of the orders of the class Syngenesia ; and signifies that several florets are enclosed within one common calyx : the five orders being named as follows, viz. —

POLYGA'MIA EQUA'LIS ; all the flowers furnished with both stamens and pistils.

————— SUPER'FLUA ; florets of the centre having both stamens and pistils, those of the circumference pistils only. The common daisy [Plate 20.] is an example of this order.

————— FRUSTRA'NEA ; florets of the centre having both stamens and pistils, those of the circumference neither.

————— NECESSA'RIA ; florets of the centre having

stamens and pistils, without seeds; those of the circumference pistils only, with seeds.

POLYGA'MIA SEGREGA'TA; several florets enclosed within one common calyx; each having, besides, a separate cup of its own.

POLYGYN'IA; the name of one of the orders, in the classes Pentandria, Hexandria, Icosandria, and Polyandria.

POLYPET'ALOUS; corolla, or flower;—having more than one petal: as the rose or the poppy. [Plates 13. and 14.]

POLYPHYL'LOUS; calyx;—many-leaved.

PRICKLES; sharp points growing from the bark, only, of a plant, and coming off along with it: as in the rose [Plate 13.] and bramble. Thorns grow from the wood. [Plate 21.]

PROCUMBENT; lying on the ground; but without putting forth roots.

PULPY; softer than fleshy; applied to fruit, as in the gooseberry and currant, and sometimes to leaves. A cherry is pulpy, but an apple is fleshy.

R

RAD'ICLE; a root-leaf proceeding immediately from the root.

RECEPTACLE; the seat, or base, upon which all the other parts of a flower are placed, and by which they are connected. It is remarkable in the artichoke, but in some flowers is not conspicuous. [Plate 1.]

RIN'GENT, or GRINNING; a term applied to the corolla of several flowers, of the class Didynamia; in which the border is divided into two parts, called lips, and is

supposed to resemble an open mouth :—as in ground-ivy [Plate 15.] When the lips are closed, the flower is called Personate.

ROOT; that part of a plant which grows in the earth, and supplies the rest with nourishment. It may be fibrous; bulbous; or tuberous, as in the potatoe.

S

SAP; the juice of plants.

SCALY; composed of scales lying one over another, like those in the skin of a fish: as the bulb of a lily, the cup of a thistle, &c.

SEAM; the line formed by the meeting of the valves in a seed-vessel. The legumen of a pea is of two valves; and all the seeds are fastened to one of the seams. [Wood-cut, page 192.]

SEED-VESSEL; a vessel or case containing the seeds.

Seed-vessels are of the following kinds, viz. —

A Capsule; as in the poppy. [Plate 14.]

A Pod; as in the wall-flower. [Plate 1. and Wood-cut, page 192.]

A Legu'men; as in the bird's-foot clover. [Plate 18. and Wood-cut, page 192.]

A Berry; as in the holly [Plate 6.] and rose [Plate 13.]

A Cone; as in the fir.

A Dru'pa, — enclosing a nut; as in the cherry and peach.

A Po'mum; as in the apple.

SEGMENTS; the divisions — of leaves, cups, or blossoms, &c.

SESSILE. See **SITTING**.

- SHEATH**; a kind of calyx; composed of a thin skinny leaf: as in the crocus and snow-drop. [Plates 4. and 8.]
- SHRUB**; a term commonly applied to plants with a perennial woody stem, divided, near the ground, into branches. Mezereon is a shrub.
- SILIC'ULA**; a short broad pod.
- SILICULO'SA**; the name of one of the orders of the class Tetradynamia; in which the seed-vessel is a Silicula.
- SIL'IQUA**; a long narrow pod. [Plates 1. and 16. and Wood-cut, page 192.]
- SILIQUO'SA**; the name of one of the orders of the class Tetradynamia; in which the seed-vessel is a Siliqua. [Plates 1. and 16.]
- SIMPLE**; applied to the stem or stalk, means undivided.
- SITTING, or SESSILE**; leaves or flowers;—joined immediately to the stem, without leaf-stalks or fruit-stalks: as the leaves of the germander-speedwell [Plate 3.], and the flowers of the mezereon [Plate 9.] The term is applied also to the down of seeds, when there is no pillar, or stalk, between it and the seed. [Wood-cut, 208.]
- SKINNY**; like skin, or gold-beaters' leaf; thin, tough, and transparent.
- SOLITARY**;—flowers, seeds, or leaves, are so called, when only one grows upon the same part of a plant.
- SPEAR-SHAPED**; shaped like the head of a spear: as the leaves of the mouse-ear. [Plate 7.]
- SPECIES**; a set of plants, which agree in the general structure of their flowers and fruit, and therefore

belong to the same genus, but differ in their stem, leaves, and other particulars.

SPIKE; a number of sessile flowers, placed alternately on each side of a simple flower stalk: as in many of the grasses.

SPIKET; a little spike; — part of a collection of florets, contained within one common calyx. The term is chiefly applied to the grasses. [Plate 5.]

STAMEN; part of a flower, composed of a filament and anther. [Plate 1.]

STANDARD; the upper petal of a butterfly-shaped blossom: as in the bird's-foot clover. [Plate 18.]

The standard is very remarkable in the common pea.

STEM; the trunk of a plant, — supporting the leaves, branches, and flower stalks, or flowers: it rises immediately from the root, or bulb. [Plates 4. and 8.]

STIPULA; a scale at the base of young leaf-stalks. [Plate 18.]

STOLONIFEROUS; putting forth suckers.

STRAW; the stem of a grass.

STROB'ILE. See **CONE**.

STYLE; that part of a pistil which stands upon the germen, and supports the summit. [Plate 1.]

SUCKERS; shoots which spring from the root, spread along or under the ground, and then take root themselves.

SUMMIT; the uppermost part of a pistil. [Plate 1.]

SUPERIOR; a term applied to the calyx or corolla, when it is placed above the germen; which last is then called Inferior: — as in the snow-drop. [Plate 8.]

The germen is Superior, when it is placed above or within the calyx or corolla: as in the speedwell, mezereon, and corn-cockle. [Plates 3. 9. and 11.]

SYNGENE'SIA; the name of the nineteenth class; anthers united, flowers compound. [Plates 2. and 20.]

T

TARGET-SHAPED; round and flattened; something like the under side of a saucer, or the head of a common brass nail; as the summit of the pistil in the poppy. [Plate 14.]

TETRADYNA'MIA; the name of the fifteenth class; six stamens in each flower, four long and two short. [Plates 1. and 16.]

TETRAGYN'IA; the name of one of the orders, in several of the classes; four pistils in each flower.

TETRA'NDRIA; the name of the fourth class; four stamens in each flower. [Plates 2. and 6.]

THORNS; sharp-pointed projections, growing from the woody substance of a plant: as in the furze, and blackthorn. Prickles grow from the bark only. [Plates 13. and 21.]

TREE; a vegetable with a single woody trunk, — divided, at the top, into branches, and enduring for many years.

TRIAN'DRIA; the name of the third class; three stamens in each flower. [Plates 2. and 4.]

TRIGYN'IA; the name of one of the orders in several of the classes; three pistils in each flower.

TRIVIAL NAME; that which is added to the generic name, to denote the species: as in the crocus vernus: — the first is the generic, the second the trivial name.

TUBE; the lower narrow part of a blossom of one petal, by which it is fixed to the receptacle: as in the crocus [Plate 4.]; mezereon [Plate 9.]; ground-ivy [Plate 15.]

U

UMBEL; a composition of flowers, in which a number of slender fruit-stalks grow from the same centre, and rise nearly to the same height; so as to form a flat surface at top: as in hemlock and cow-parsnip. The separate stalks, or ribs, are often called the Spokes of the umbel.

UMBELLIFEROUS; a term applied to plants, which produce their flowers in umbels.

UMBELLULE; a little umbel. In several umbelliferous plants each spoke of the umbel has an umbellule at its end.

UNDER-SHRUB; a plant the lower part only of whose stems is woody; but whose upper part is herbaceous, and dies every year.

V

VALVES; the pieces that compose a seed-vessel. [Woodcut, page 192.] The pod of the wall-flower has two valves, with a partition between them. [Plate 1.] —The term is applied also to the projecting substances which, in some blossoms, close the mouth of the tube: as in the mouse-ear. [Plate 7.]

VARIETIES; plants of the same species, which differ slightly from each other; as in colour, size, or some other unimportant circumstance. The purple, yellow, and white crocuses, for example, are varieties of

the species ver'nus. Differences of species are reproduced when plants grow from seed ; but not varieties.

VEIL ; a conical covering of the capsule in several mosses ; somewhat like an extinguisher. [Plates 2. and 21.]

VIVIP'AROUS ; a term used where the seeds germinate or grow upon some part of the parent plant, instead of falling to the ground, as is common : examples of this kind may be seen in several of the grasses.

W

WHEEL-SHAPED ; a term applied to a blossom of one petal, with a flat border, and a very short tube ; like that of the germander-speedwell. [Plate 3.]

Wings ; the side petals of a butterfly-shaped blossom. [Plate 18.]

WINGED ; applied to seeds, — furnished with a thin flat membrane, on each side : as in the maple.

WOODY ; like wood, not herbaceous : as the principal stem of the wall-flower. [Plate 15.]

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