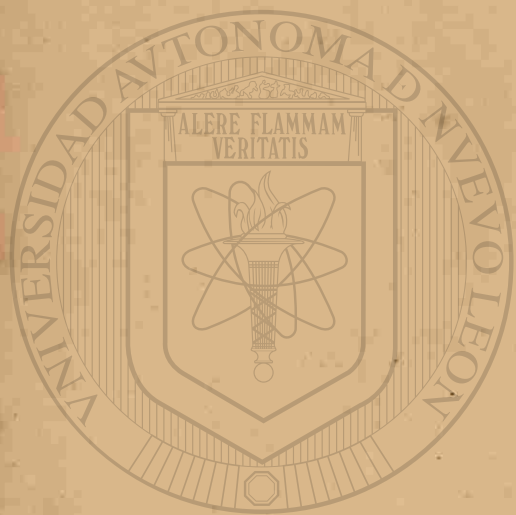


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AND HE SAW THAT IT WAS GOOD." - GEN. 1:12.

NEW EDITION



OF

BOTANY FOR BEGINNERS:

BIBLIOTECA

AN

INTRODUCTION TO MRS. LINCOLN'S

LECTURES ON BOTANY,

FOR

THE USE OF PUBLIC SCHOOLS, AND THE YOUNGER PUPILS
OF HIGHER SCHOOLS AND ACADEMIES.

BY MRS. LINCOLN PHELPS,

AUTHOR OF "LINCOLN'S BOTANY," "PHELPS'S PHILOSOPHY," "CHEMISTRY," "FIRESIDE
FRIEND," "IDA NORMAN," "HOURS WITH MY PUPILS," ETC.

TWO HUNDRED AND SEVENTIETH THOUSAND.

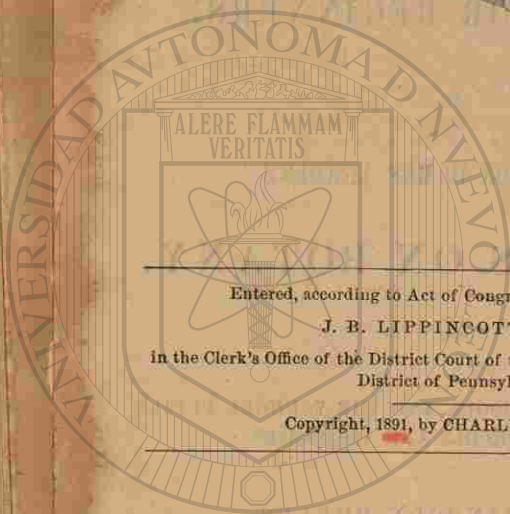


STEREOTYPE EDITION.

PHILADELPHIA:

J. B. LIPPINCOTT COMPANY.

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EXPLANATION OF THE FRONTISPIECE.

PLANTS were made on the *third* day of the Creation. At the command of God, grass appeared upon the earth, the shrub and the tree, each yielding fruit, *after its kind, whose seed was contained within itself*, for the reproduction of the same while the earth should exist.

The plate represents the appearance of the earth at this exact period; darkness had been separated from light; the waters, gathered together, had left the land dry and solid for the support of vegetation. The sun had not yet been created; no animal existed; no eye but that of God then beheld the earth. We see represented the darkness still retreating from the light, as in the morning twilight. We must imagine the solemn silence which brooded over the broad earth: no hum of insect, song of bird, or lowing of animal was heard, for it was not until the fourth day (*or period of time*) that the sun was created; and not until the fifth day, that the earth became animated with living things, which had voices, and could move. The plants had only vegetable life; they were made for the use of the animal creation, and to adorn the face of the earth. The Creator beholding His work at this stage, "saw that it was good." The plate exhibits vegetation in different forms, grass and rushes by the margin of the waters. In the centre of the foreground of the picture, is a small plant with broad leaves; it is called the side-saddle plant.* Back of this is the papaw tree † of the Tropics, with its rich clusters of

* *Sarracenia purpurea*. See Plate III. Lincoln's Botany.

† *Carica papaya*. See Plate IV. Lincoln's Botany.

EXPLANATION OF THE FRONTISPIECE.

fruits. On the left is a strange-looking tree, resembling a gigantic fern; this is the sago tree.* Further in the background we see the well-known oak, with its spreading branches; and far off on the horizon appears the outline of the banyan tree (see page 14). Coming back to the foreground of the picture, we see a little to the left of the centre a huge stalk of Indian corn, with its full ears of ripened fruit; its barren, staminate-flowers are conspicuous as a feathery crown at the summit of the stem; (see page 159, *ZEA*) yet, though they have no fruit, they are essential in the vegetable economy to the production of the fruit from the pistillate flowers below, now changed into the golden corn, every thread of silk having been a long pistil to which the germ or infant seed was attached.†

* *Cycas circinalis*. See Plate VII. Lincoln's Botany.

† See Lincoln's Botany, Natural Order, Gramineae, page 298.

P R E F A C E

TO

J. B. LIPPINCOTT & CO.'S NEW EDITION OF MRS. LINCOLN
PHELPS'S "BOTANY FOR BEGINNERS."

EUTAW PLACE, BALTIMORE, Md., July 15th, 1863.

THE author has seen with regret that the study of Botany in Primary Schools, and Juvenile Classes in Seminaries and Institutes, has of late become less popular than formerly. She would urge that when made interesting, as it may be, this study is pleasing to the pupil, and useful in its effects on the mind, leading to the love of flowers, to healthful exercise in collecting them, and by the beautiful analytical process of classification, teaching a practical logic.

But it is useless to attempt to interest Beginners in Botany by presenting to them the abstruse principles of physiology, and wearisome research into the various supposed, but doubtful alliances among the vegetable tribes. Under the attractive name of the "Natural System," learned Botanists have brought together most *unnatural* combinations and *unsystematic* arrangements. Let Beginners be satisfied with simple steps at first: may there be found among such some future Linnæus, who will gather up the disjointed fragments of the Natural System into one harmonious organization!

Better that the young should know something of plants, even though they should not become learned Botanists, than that this great portion of God's works should be to them as one vast sealed book. Our senses may enjoy the odour and the sight of flowers—they may appeal to our emotions as festal or funeral appendages, but God made plants for us to *study*, as well as to enjoy and love.

INTRODUCTION.

THE STUDY OF PLANTS.

God made plants for the study of man, as well as for utility and beauty. The seed, ever true to its nature, always brings forth the plant after its own kind; it is therefore the *essential organ*: on its structure is founded what is called the "*Natural System*" in Botany, the outline of which we will briefly state:

Take an acorn, (the seed of the oak), and then remove the outer coat or skin. The seed will voluntarily divide into two parts (called cotyledons, see page 93); nestled in a little cavity at one extremity of the seed is the germ, or embryo plant—this is a miniature oak tree. Now examine a kernel of Indian corn; you will not find it composed of two distinct lobes or cotyledons like the acorn. The germ is seen at what is called the eye of the seed.*

We perceive in the beginning of the life of plants a great difference between plants of different kinds; this can be readily observed by placing seeds upon moistened cotton in a glass vessel, and watching from day to day the gradual development of the germ. In the difference in the manner of their growth is founded the great division of plants in the Natural System. In the full-grown oak, which has proceeded from the seed with two cotyledons, and in the Indian corn with one cotyledon, there are the following remarkable differences:

First—The oak has a *branching* stem. The corn has a *simple* stem.

Second—The oak has grown by the increase of tissues *from the outside* of the stem, and the wood is hardest towards the centre. The corn has grown from the *inside*, pushing outwardly, and is hardest at the outside.

Third—The leaves of the oak are *net-veined*. The leaves of the corn are *straight-veined*.

We shall now leave the pupil to begin the study of Botany, in which he will be led, gradually, to an understanding of the wonderful organization of the vegetable kingdom, and the different modes of classifying plants.

* Refer to page 91 for an explanation of the seed and the germinating process.

CHAPTER I.

*Advantages of the Study of Botany.**

1. You are now about to commence a study which was formerly thought too difficult for children, but which is, in reality, much easier than many to which they usually attend.

2. In Grammar, you can have no assistance from maps or pictures,—every thing in this science depends on the powers of the understanding; and it affords no pleasant objects to delight the eye. But Grammar is a very useful study, and should be pursued while you are young; and other studies, especially the one you are about to commence, will help you to understand it.

3. Geography is easier than Grammar, because you may have maps or pictures of countries before you, and the eye impresses on the mind the relative situation of places, the direction of mountains, the course of rivers, &c.—but if, instead of maps, you could have the countries themselves before you, to examine with your eyes and hands, if you could see the people who live in them standing before you, how much deeper would be your impressions of Geography!

4. You are now to study Botany; here the objects about which you are to learn, will be placed before you, to *see*, to *touch*, and to *smell*. Thus three of your *senses* will be called upon to aid the *memory* and *understanding*; and as flowers are objects of much beauty and interest, your *imagination* also may be gratified.

5. Your *emotions*, too, will be warmed by the thought of His love and kindness who causeth the earth to bring forth, not only

* NOTE.—It is important, for the teacher to ask the pupils to give the heads of the chapters, either at the commencement or close of the lesson.

1. What is said of the study you are about to commence?
2. What is said of the study of Grammar?
3. What renders Geography an easier study than Grammar?
4. Are the objects about which you study in Botany manifested to the senses?
5. What effect has the contemplation of flowers upon the emotions?

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5. What effect has the contemplation of flowers upon the emotions?

'grass for the beasts of the field, and food for the use of man,' but a rich succession of curious and lovely blossoms for our admiration and enjoyment.

6. In Botany you study things which God has made. When examining plants, with all their wonderful varieties, and observing the wise provision which is made for their growth, and the perfection of the seed, with the mutual relations of the various parts to each other, you must remember to give the praise to Him whose infinite mind directs and watches over the growth of the most humble plant, at the same time that he upholds the vast worlds which he has created, and which every moment need his sustaining care. Every motion we make, every breath we draw, and every pulsation of our hearts, show that this same care is over us too; for without it, we could no more live, than we could have created ourselves.

7. Before attempting any new thing, we should always understand the reasons for so doing. I will now tell you why your parents and instructors wish you to learn something about Botany. 1st. It is a delightful study: it presents you with sweet and pleasant objects, the contemplation of which is calculated to render your tempers mild and amiable. It will always furnish you with an agreeable amusement, which is not only innocent, but of a nature to refine and improve your minds.

8. 2d. If you live in a city, your friends may have house-plants or gardens, and you may sometimes go to public gardens, where the most wonderful plants of all countries are collected, — will it not be pleasant, when you meet with flowers, to be able to find, by examining a book, what are their true names, their characters and habits, and their medicinal qualities?

9. 3d. There are a great many other things too, which Botany will teach you, such as the offices performed by the root, stem, leaves, and other organs of the plant, especially by the different parts of the flower, to which is assigned the care of forming and ripening the seed.

10. 4th. If you live in the country, every mountain-glen, every meadow, the banks of every little brook, and the waysides, will show you the different families of plants, which appear, one after another, from April till October. And many a beautiful blossom will lift up its little head in your rural walks as if to

6. Whose works do we examine in the study of Botany?

7. What advantages are first mentioned as connected with the study of Botany?

8. What advantages of the study are mentioned secondly?

9. What thirdly?

10. What fourthly?

ask your notice. If you know nothing of Botany, you may indeed love to look at pretty flowers, and to pull them to pieces, but in this there is little amusement and no instruction. It is when your reason is brought into action in order to examine how these wonderful pieces of work are put together, and to trace their various properties and relations, that the notice of flowers becomes important as a means of improvement.

11. 5th. The study of Botany will teach you to be systematic in other things: you will find that men of science have so arranged plants, that all, even dandelions, daisies, and thistles, have their exact places in the system of classification.—It is this exactness of arrangement which makes us able, amidst so vast a multitude of plants, to find the description of each one. If all the articles in a house were thrown together without order, you would be troubled to find a needle, a pair of scissors, a book, or an article of dress. But by means of system, a person who possesses a hundred thousand articles, may arrange them so that any one can be found at any moment.

12. As a house is divided into apartments, so in Botany the vegetable kingdom is divided into *classes*; as each apartment contains sideboards, bureaus, closets, &c., for disposing of different articles, so each class in Botany contains *orders* in which are arranged the individual plants. There are also subdivisions of *orders* in Botany, which may be considered as corresponding to the different drawers of bureaus, and shelves of closets, so that a Botanist is seldom obliged to look over a whole order before he finds the particular plant which he seeks for. Now some children are very careless with respect to the arrangement of the clothes, books, and other articles, with which their kind friends provide them: it appears to me, that when they see how beautiful is the systematic arrangement of plants in Botany, they will at once resolve that every thing which belongs to them, or that they have the care of, shall be arranged according to some rule, so that they may always find what they want, without being obliged to make a long search for it. I could spend a great deal of time in telling you of the advantages of a knowledge of Botany; but it is better that you should proceed directly to the study, and then your own minds will suggest to you many reasons why it is to be classed among the most useful and interesting branches of science: I will however mention one farther recommendation of this study.

11. What fifthly?

12. How do the divisions of a house correspond to the divisions in Botany?

13. 6th. I leads us to love and reverence God. Flowers are presents which our heavenly Father gives us. It is therefore proper that we should examine and study them. We see that He who made them must be *wiser* and more *powerful* than the greatest of men—for what man could make the least plant? We can imitate flowers in wax and various other ways, but who can give them life?

None can the life of plant or insect give
Save God alone——.

14. Flowers may be considered as tokens of God's love to us;—"If God so clothe the grass of the field, which to-day is, and to-morrow is cast into the oven, will he not much rather clothe us?" He

Scorns not the least of all His works; much less
Man, made in His image, destined to exist,
When e'en yon brilliant worlds shall cease to be.
Then how should man, rejoicing in his God,
Delight in His perfections, shadow'd forth
In ev'ry little flow'r and blade of grass!——
Each op'ning bud, and care perfected seed,
Is as a page where we may read of God.

CHAPTER II.

Division of the Sciences.—Different parts of flowers.—Importance of Botanical arrangement.

15. We are now about to commence our new study.—There are many sciences to be learned by those who wish to be wise, but yet all things which exist in the whole universe may be classed under *two* heads, *mind*, and *matter*.

16. *Mind* or spirit cannot be seen by us, although it exists in all rational beings, and is that within us which *thinks* and *feels*.

17. God is a spirit; he is not like us confined to any *body*, or *portion of matter*, but as the sun's rays spread abroad over the earth, so the presence of God extends to every part of his crea-

13. What advantages are mentioned sixthly as connected with the study of Botany?

14. How may flowers be considered?

15. Under what two heads may all things which exist be classed?

16. What is observed of mind or spirit?

tion; we do not perceive him, because we cannot see *mind*. When our spirits are separated from the *body*, or *matter*, they will no doubt at once perceive that they are in the presence of God.

18. The science which treats of the *Deity*, and of our duties to Him, is called *Theology*.*

19. The science which treats of the *Human mind*, is called *Philosophy of the mind*, or *Metaphysics*.†

20. The study of *matter* is sometimes called by the general term *Physics*; it is divided into three general heads.

1. *Natural Philosophy*.

2. *Chymistry*.

3. *Natural History*.

A mere definition of Natural Philosophy and Chymistry would not enable you to understand what these sciences are, but you will soon be able to study them with pleasure and profit.

21. Natural History, or the History of Nature, is divided into,

22. 1. *Zoology*,‡ which treats of animals.

23. 2. *Botany*, which treats of plants.

24. 3. *Mineralogy*, which treats of stones, &c. This science includes Geology, which treats of rocks, the manner of their formation, and the various changes which have taken place on the surface of the globe, since its creation.

25. The word *Botany* is derived from the Greek *botane*, which signifies a plant. The objects of this science are the vegetable kingdom, including every thing which grows out of the earth, having *root*, *stem*, *leaf*, or *flower*.

26. There are two principal departments in Botany; 1st, that which treats of the classes and orders of plants; this is called *Systematic Botany*.

NOTE.—The attention of the pupil should be directed to the notes which point out the derivation of words.

* From the Greek *Theos*, God, and *logos*, a discourse.

† From *meta*, beyond, and *phusis*, nature.

‡ From *zoe*, life, and *logos*, a discourse.

18. What is that science called which treats of the Deity?

19. What is the science which treats of the Human Mind?

20. How is the study of Matter divided?

21. What are the branches of Natural History?

22. What does Zoology treat of?

23. What does Botany treat of?

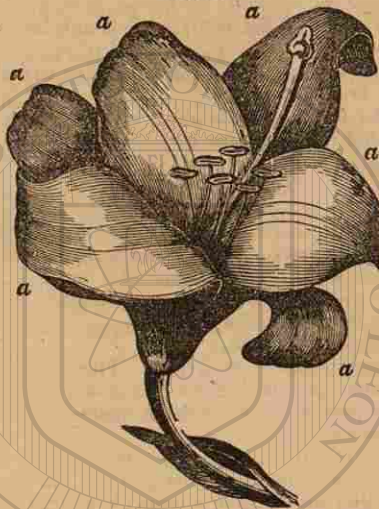
24. What does Mineralogy treat of?

25. From whence is the term Botany derived, and what are the objects of the science?

26. What is systematic Botany?

27. 2d. That which treats of the different parts of the plants and their uses; this is *Physiological Botany*.

Fig. 1.



28. In beginning to study Botany, it is best to examine first the parts of a flower.

29. Here is a *lily*, Fig. 1; that part of it which you would call the blossoms, is the *corolla*;* this is composed of six parts, each of which is called a *petal*.

30. There are within the corolla six thread-like organs; these are called *stamens*; examine them as they appear at Fig. 2. You see that one part, as at *a*, is long and slender; this is called the *filament*, from *filum*, a thread. At *b* is a little knob which is hollow like a box; this is the *anther*.

* So called from the Latin *corolla*, a little crown.

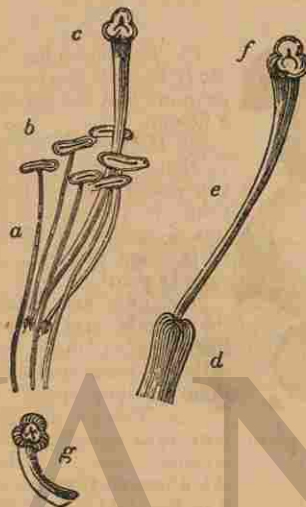
27. What is physiological Botany?

28. What is the best way of beginning the study of Botany?

29. What are the botanical names of the blossom of a lily and its parts.

30. Describe the stamens and their parts.

Fig. 2.



31. In the centre of the lily is the *pistil*; this consists of three parts, the *stigma*, (see Fig. 2. *f*) the *style*, (*e*) and the *germ*, (*d*).

32. The end of the flower stem, where the petals of the flower are inserted, is called the *receptacle*; you may see it at Fig. 2. *g*.

33. In most flowers you will observe the corolla standing in a little green cup; this is called the *calyx*.* The lily has no calyx, but the rose and the pink have.

34. I have now told you of five parts of a flower:

1. *Calyx*—the cup; surrounding the corolla.
2. *Corolla*—the blossom; the parts are called petals.
3. *Stamens*—enclosed by the corolla; the parts are the filaments and anther.
4. *Pistil*—standing in the centre; the parts are the germ style, and stigma.
5. *Receptacle*—bearing the other parts of the flower.

35. Besides these, there are two other parts, which are considered as belonging to the flower: viz. the *pericarp* and the *seed*.

* The word *calyx* signifies a cup.

31. Describe the pistil and its parts.

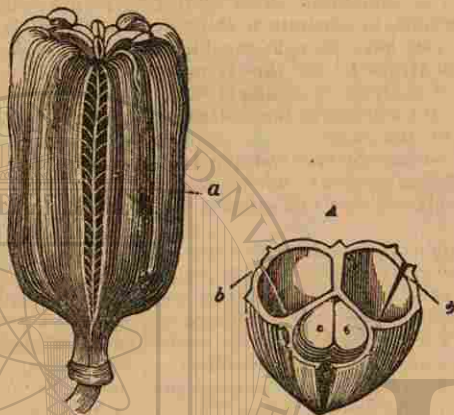
32. What is the receptacle?

33. What is the calyx?

34. Name the five parts of a flower which have been mentioned.

35. What two other parts belong to the flower?

Fig. 3.



36. The *pericarp* is only the germ when it becomes ripe; it is this part of the flower which contains the seed.

37. At Fig. 3, *a* is a representation of the pericarp; you will perceive it is much larger than the germ at Fig. 2. *f*. At *b* the pericarp appears as if cut across, and shows three divisions, these are called *cells*, each of which contains two seeds in the shape of a triangle, as at *bb*.

38. The *seed* is, as you have seen, carefully packed away in little cells in the pericarp;* this is the most important part of the flower; and it seems as if all the other parts were chiefly intended to nourish and protect this.

39. If you add the pericarp and the seed to the five parts which you have already learned, you will then have *seven* parts of the flower to remember. These are called *Organs of Fructification*, from *fructus*, fruit, and *facio*, to make.

40. I shall hereafter inform you more particularly respecting

* The word *pericarp* is derived from the Greek words, *peri*, around and *karpos*, fruit.

36. What is the pericarp?
 37. Describe Fig. 3.
 38. What is the most important part of the flower?
 39. How many parts constitute what are called the organs of fructification?
 40. What is meant by analyzing a flower?

these organs, or members of the flower; but must now proceed to teach you something about analyzing plants;—The word *analyze* means, to separate a thing into parts; in one sense, therefore, you have now, in considering the different organs of a flower, analyzed it: but this is only to prepare you for another kind of analysis, by means of which you will be able to tell where a plant belongs in the botanical system, and what is its systematic or true name.

41. In the introductory chapter, I spoke of the importance of systematic arrangement; when you learn something of Botany, you will perceive that this science could not exist without system.

42. Formerly botanists endeavoured to give descriptions of plants; but having no rules to go by, they were not able to understand each other. If a person wished to learn about any particular plant, he might be obliged to look over a great many pages, or a whole book, before he could find it; because he had no rule to guide him in his search.

43. When you look out a word in a dictionary, you search for the first three letters, and as the words are arranged by rule, you can find immediately what you wish. If all the words in a dictionary were thrown together without any order, how discouraging would be the task of looking for definitions.

44. Now it is just so with respect to describing plants; we must be guided by some rule in their arrangement.—What shall this rule be? Suppose we should arrange the names of plants in alphabetical order, and then give descriptions of them.—But here is one great difficulty; the names by which people who do not understand Botany call plants, are not the same in different places; persons whose gardens are very near each other, will often call the same flower by different names; and in different countries, the names of plants are expressed in different languages; what we call *corn*, is in French, *blé*, and in Latin, *ceres*. Without some general system, therefore, you perceive we could not learn any thing of the plants of different countries, and could not understand each other even with respect to our own plants.

45. After a great many attempts had been made to class

41. Is systematic arrangement necessary in Botany?
 42. Why were the botanists of former times unable to understand each other?
 43. By what rule are words in a Dictionary arranged?
 44. Would the description of plants in alphabetical order, serve as a rule for botanical arrangement?
 45. How did Linnæus propose to arrange plants?

plants, Linnæus, of Sweden, proposed to arrange them under *classes* and *orders*, by means of the *stamens* and *pistils*. He had discovered that these organs existed in all plants; that some had one stamen, others two, three, &c. and that it was the same with regard to the pistils, which, although the lily has but one, are numerous in the rose and some other plants. In the next chapter I shall tell you something more of the classes of Linnæus, and teach you how to analyze a flower according to his system.

ALERE FLAMMAM
VERITATIS

CHAPTER III.

Practical Botany commenced by the analysis of the Pink. Method of preparing an Herbarium—Botanical excursions—The study of nature the duty and privilege of intelligent minds.

46. Plants, as I have told you, are arranged in classes and orders by their stamens and pistils. The largest division is that of *classes*.

47. There are *twenty-one* classes.

48. Each class is divided into *orders*.

49. A plant with one stamen belongs to the first class; as there are some plants here with one pistil, and others with two, there are a first and second order in the first class.

46. What is the largest division of plants?

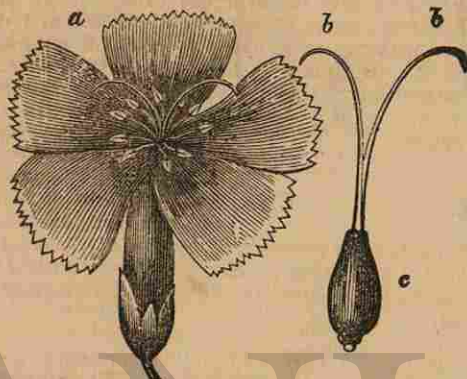
47. How many classes are there?

48. How is each class divided?

49. What circumstances would place a plant in the first or second order of the first class?

Analysis of the Pink.

Fig. 4.



50. You will understand this better if I give you an example. You shall now analyze a flower in order to find its botanical arrangement and name. Here is a pink. We wish to know in what *class* it is—count the stamens—you say *ten*, therefore this is in the *tenth* class; the name of the class is Decandria (from *deka*, ten, and *andria*, stamens.)

51. We wish to know in what *order* this flower is—count the pistils—you say *two*, it then belongs to the second order of the tenth class; the name of this is Digynia (from *dis*, two, and *gynia*, pistil.)

52. Orders are composed of *families* of plants called *genera*, which is the plural of *genus*.

53. We must, as a third step in our analysis, learn to what *genus* this flower belongs; for this purpose it is necessary that you turn to that part of your book called "*Description of the Genera of Plants*;"* look for Class 10, Order 2.—Now instead of looking a whole book through, you have only to examine the genera which you find under this order, and to compare your flower with each description until you find one which answers to it.

* To find this, see the "Table of Contents."

50. How can you find in what class the pink is placed?

51. How can you know in what order the pink is?

52. Of what are the orders of plants composed?

53. What is a third step in the analysis of the pink?



54. The first genus mentioned is, "HYDRANGEA;" this is said to have a "calyx 5 toothed, superior;" examine the calyx of the pink (Fig. 5, a;) this is five toothed, or has five notches around the top of it, but it is not superior, that is, the calyx does not stand above the germ. Your flower is not therefore of the genus Hydrangea, because it does not fully agree with the description.

55. SAXIFRAGA. "Calyx 5 parted, half superior;" although the first part of this description agrees with your flower, the last part does not correspond with it.

56. SAPONARIA. "Calyx inferior," (under the germ,) "1 leafed," (all of one piece;) "tubular," (long and hollow like a tube,) "5 toothed;" so far this description applies to your flower.—But the next circumstance, "calyx without scales," is different from what you see in the pink. (See Fig. 5. b.)*

57. "DIANTHUS. Calyx inferior, cylindrical" (long and roundish;) "1 leafed, with 4 or 8 scales at the base; petals 5," (See Fig. 4. a) "with claws," (the petals long and slender at the lower part;) "capsule" cylindrical, 1 celled (the capsule is a kind of pericarp;) "dehiscent," this means gaping, as you see at Fig. 5. c, which represents the capsule or seed vessel of the pink as it appears when ripe, the valves or pieces which compose it, open of themselves as if for liberating the seeds. At d the capsule appears as if cut horizontally, showing the seeds all contained in one cell. Fig. 4 at c shows the capsule as it appears when the pink is in blossom, at which time it is called the germ. As this flower agrees in every particular with the last mentioned description, you may be certain you have now found its genus; the pink then belongs to the genus DIANTHUS.

* This represents the scales of the calyx of the pink.

54. Why does not this flower belong to the genus *Hydrangea* ?
 55. Why is it not of the genus *Saxifraga* ?
 56. Why is it not *Saponaria* ?
 57. Why is the pink of the genus *Dianthus* ?

58. You have a fourth step to go in the analysis of this flower; for each genus is composed of several sorts or species of plants.—It is necessary to know to what species of the genus *Dianthus* this flower belongs.

59. Look in the latter part of your book for the "Description of species of plants."* Here you find the genera arranged in alphabetical order, each genus being followed by a description of its species. If you have a natural flower with its leaves, you can now compare it with the specific descriptions.

60. "*Armeria, flowers aggregate*;" this means clustered together on one stalk; but pinks do not grow in this manner therefore the plant is not of this species.

61. "*Barbatus, flowers fascicled*," (bundled together;) it cannot be this species, because the flowers are not fascicled.

62. "*Caryophyllus, flowers solitary, scales of the calyx sub-rhomboid*;" (sub-rhomboid means somewhat diamond shaped,) "very short, petals crenate," (scalloped on the edge,) beardless, (without hair or down.) The pink is in all respects answerable to this description. It is also added, that the leaves are "linear," which means long and narrow; "subulate," signifies pointed at the end like a shoe-maker's awl; "channelled," signifies having a groove or channel running through the leaf.

63. You have now learned the class and order of the pink, with the genus and species to which it belongs. The botanical name of the pink is,

DIANTHUS caryophyllus.

It belongs to,

Class 10. DECANDRIA. Order 2. DIGYNIA.

64. Having analyzed a flower, you must now take one of the same kind, and lay it between sheets of paper to dry, having a weight placed over to press it. Every person who would become a Botanist, should preserve specimens of all the plants he meets with. A book of such specimens is called an *herbarium*.

65. There are few parents who would not delight to see a handsome herbarium made by their child. There is no diffi-

* See "Table of Contents."

58. What is the fourth step in the analysis of a flower ?
 59. Where are you to look to find the species ?
 60. Why is not the pink of the species *armeria* ?
 61. Why is it not of the species *barbatus* ?
 62. Why is it not of the species *caryophyllus* ?
 63. What have you now learned respecting the pink ?
 64. What is an herbarium ?
 65. Describe the process of preparing plants for an herbarium.

culty in your affording your parents this gratification. All that you need in pressing plants, is some sheets of paper, (newspapers will answer, they are better than more firm and stiff paper) a board, and a stone or some other weight to press the plant. Some leaves and flowers of the plant should be carefully spread out upon one sheet of paper, and half a dozen other sheets placed over them;—the board with the weight should then be laid upon the upper sheet of paper. The plants at first, ought to be taken out and placed between dry sheets of paper as often as once or twice a day. Some will dry in a few days, others require more time.

66. When you have as many as fifty specimens prepared, you can then arrange them in a blank book, fastening upon the first page of each leaf one or more flowers, either with glue or by means of cutting through the paper and raising loops, under which the stems may be placed. By the sides of the plant should be written the *class*, *order*, *genus*, and *species*, and also the place where found, that is, whether in dry or wet ground, low or mountainous, &c., and also at what season of the year. Such herbariums would do children much credit if prepared to be exhibited at public examinations of their school.

67. Young botanists, as well as those who are older, may derive great pleasure in making excursions into the fields, and upon the hills and mountains, for the purpose of collecting plants. Thus they learn to love every blossom which springs up under their feet; their hearts beat with pleasure when they meet with some little strange flower, which exhibits new traits in the character of the vegetable race. Every murmuring brook shows its banks clad with flowery treasures; the forests and groves exhibit another, but not less beautiful assemblage of plants; and the mountain, the valley, and the sea coast, have all their own peculiar vegetable productions.

68. Did the great Being who created such a profusion of these beautiful and curious objects, and who also gave to children eyes to see, hearts to love, and understandings to study them, intend they should pass them by with neglect? No, my dear children, it is your duty, as it should be your pleasure, to search into the wonders of created nature, to exercise your mental faculties, and to animate your pious feelings in thinking much upon the works of God.

66. How should dried plants be arranged in a book?
 67. What is said of making botanical excursions?
 68. What is said of paying attention to the works of God?

CHAPTER IV.

Introduction to Practical Botany continued—Latin and Greek Numerals—Classes of Linnæus.

69. You have been taught to analyze one flower;—while you were doing this, did not many thoughts seem of themselves to come into your minds? You examined a lily; you found it had *six stamens*, and *one pistil*, and it is very likely you thought that if the pink was in the *tenth* class and *second* order because it had *ten* stamens and *two* pistils, the lily must be in the *sixth* class and *first* order—it is so.

70. Now when you learn one fact it will bring many new thoughts to your mind; and this furnishes great encouragement for you to study; since you not only gain the knowledge which is the immediate object of your search, but are enriching your minds with many connected ideas which follow in its train.

71. You will, perhaps, now think that all flowers are classed by the *number of stamens*, but this is not correct, for as some have more than a hundred stamens, such an arrangement would be making quite too many classes; and besides, it is found that such plants as have more than ten, often vary in the number of stamens, so that only the first ten classes depend on this circumstance.

72. Linnæus discovered that the stamens of some plants grew upon the *calyx*, and others upon the *receptacle*; the rose is of the former kind, and the poppy of the latter.

73. Take off the petals of a rose and you will perceive the stamens to be inserted upon the calyx; for this reason it is of the 11th class; and because it has many pistils it is in the 13th order.

74. The name of the genus is *Rosa*. In this genus are many species; as *Rosa muscosa*, or the moss rose, which has upon its calyx and stems a collection of hairs resembling moss. *Rosa alba*, the white rose, distinguished not only by the whiteness of its petals, but by peculiar circumstances of the leaves and stems.

69. After learning the classification of the pink, what should you infer respecting the class and order of the lily?
 70. What should encourage you to learn?
 71. Are all flowers classed by the number of stamens?
 72. Are the stamens of all plants placed in the same position?
 73. Why is the rose in the 11th class, 13th order?
 74. What is observed of the different species in the genus *rosa*?

75. The apple blossom appears like a little wild rose, it belongs to the same class and order as the rose, but is of a different genus.

76. If you examine a poppy, you will find numerous stamens growing upon the receptacle or top of the flower stem, this is therefore of the 12th class. It has but one pistil, and is therefore in the 1st order.

77. Having made you acquainted with some of the principles in Systematic Botany, and taught you how to proceed in the Analysis of flowers, I shall now give you to learn the Latin and Greek numerals, which, added to certain other words, compose the names of the Classes and Orders.

It is not in Botany alone that a knowledge of these numerals will be useful to you; many of our most common words are compounded with them; for example, *uniform* is from *unus*, one, and *forma*, form,—*octagon*, is from *octo*, eight, and *gonia*, angle, &c.

NUMERALS.

78. Latin.	Numbers.	Greek.
Unus,	1.	Monos, single.
Bis,	2.	Dis, twice.
Tres,	3.	Treis.
Quatuor,	4.	Tettares.
Quinque,	5.	Pente.
Sex,	6.	Hex.
Septem,	7.	Hepta.
Octo,	8.	Okto.
Novem,	9.	Ennea.
Decem,	10.	Deka.
Undecem,	11.	Endeka.
Duodecem,	12.	Dodeka.
Tredecem,	13.	Dekatreis.
Quatuordecem,	14.	Dekatettares.
Quindecem,	15.	Dekapente.
Sexdecem,	16.	Dekaex.
Septemdecem,	17.	Dekaeptha.
Octodecem,	18.	Dekaokto.
Novemdecem,	19.	Dekaennea.
Viginti,	20.	Eikosi.
Multus,	Many.	Polus.

75. What is said of the apple blossom?

76. Why is the poppy in the 12th class, 1st order?

77. Is it in Botany alone that a knowledge of Greek and Latin numerals is useful?

CLASSES OF PLANTS.

79. These are founded upon distinctions observed in the STAMENS.

80. All known plants are divided into *twenty-one classes*.

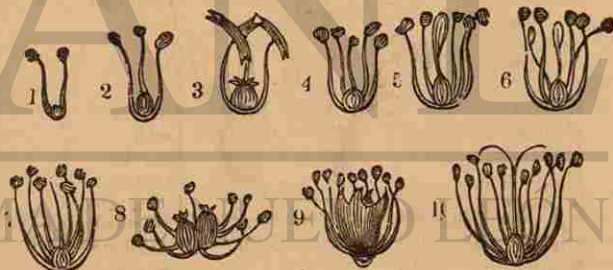
81. The first twelve classes are named by prefixing Greek numerals to ANDRIA, which signifies *stamen*.

82. The first ten classes depend on the number of stamens

CLASSES.

Number of Stamens.	Names.	Definitions.
83.	1. MON-ANDRIA,	<i>One Stamen.</i>
	2. DI-ANDRIA,	<i>Two Stamens.</i>
	3. TRI-ANDRIA,	<i>Three Stamens.</i>
	4. TETR-ANDRIA,	<i>Four Stamens.</i>
	5. PENT-ANDRIA,	<i>Five Stamens.</i>
	6. HEX-ANDRIA,	<i>Six Stamens.</i>
	7. HEPT-ANDRIA,	<i>Seven Stamens.</i>
	8. OCT-ANDRIA,	<i>Eight Stamens.</i>
	9. ENNE-ANDRIA,	<i>Nine Stamens.</i>
	10. DEC-ANDRIA,	<i>Ten Stamens.</i>

Fig. 6.



NOTE. The pupil should be required to give the derivation of the names of the classes; as "Monandria, from *Monos*, one, and *Andria*, stamen," &c.

78. Repeat the numerals.

79. On what are the classes founded?

80. How many classes are there?

81. How are the first twelve classes named?

82. What classes depend on the number of stamens?

83. Repeat the names of the first twelve classes.

84. Number and position. { 11. ICOS-ANDRIA,* (Eikosi.) 20
 { 12 POLY-ANDRIA, (Polus.) many. } *Over ten stamens inserted on the Calyx. Over ten Stamens inserted on the Receptacle.*

Fig. 7.



85. The two following classes are named by prefixing Greek numerals to DYNAMIA, which signifies *power* or length.

- Number and relative length. { 13. DI-DYNAMIA, } *Having four stamens; two of which are longer or more powerful than the other two.*
 Number and relative length. { 14. TETRA-DYNAMIA, } *Having six stamens; four of which, are longer or more powerful than the other two*

Fig. 8.



86. The two following classes are named by prefixing Greek numerals to the word ADELPHIA, which signifies *brotherhood*.

- { 15. MON-ADELPHIA. } *Stamens united by their filaments in one set or brotherhood.*

* The name of this class does not now designate its character, since the number of stamens is often more or less than twenty.

84. What are the two classes which depend on the number and position of the stamens?

85. What two classes depend on the number and relative length of stamens?

86. What two classes have their stamens united by their filaments?

16. DI-ADELPHIA, *Two brotherhoods.*
 The next class is named by prefixing SYN, signifying *together*, to GENESIA, which signifies *growing up*.
 17. SYN-GENESIA, { *Five united anthers. flowers compound.*

87.

Fig. 9.



88. The next class is named by an abbreviation of the word GYNIA, which signifies pistil, prefixed to ANDRIA, showing that the stamen and pistil are united.

18. GYN-ANDRIA, { *Stamens growing out of the pistil.*
 The two following classes are named by prefixing numerals to ÆCIA, which signifies a house.
 Position. {

89. 19. MON-ÆCIA, { *Stamens and Pistils on separate corollas upon the same plant or in one house.*
 90. Position. { 20. DI-ÆCIA, } *Stamens and Pistils in separate corollas upon different plants or in two houses.*

Fig. 10.



91. The name of the last class is a compound of two Greek words, CRYPTOS, and GAMIA, signifying a concealed union.

87. What class has the stamens united by their anthers?
 88. What class has the stamens growing out of the pistil?
 89. Describe the class Monœcia.
 90. Describe the class Diœcia.
 91. Describe the class Cryptogamia.

Natural. } 21 CRYPTO-GAMIA. { *Stamens and Pistils invisible, or too small to be seen by the naked eye.*

Fig. 11.



Lichens.

Mushrooms.

Ferns.

Mosses.

92. All plants are either *Phenogamous*, with stamens and pistils visible, or *Cryptogamous*, with stamens and pistils invisible; the first twenty classes are of the former, the twenty-first class of the latter kind.

93. You have now been taught the classes into which plants are divided—It is important that these should be well understood, and that as early as possible, you collect some plants of each class.

CHAPTER V

Orders of Linnæus—Synopsis of Classes and Orders.

94. THE classes are divided into *Orders*. Each class usually contains several orders; you will best learn to distinguish them by practice in analyzing plants, though it is proper you should learn their names, and the circumstances on which they are founded.

ORDERS OF PLANTS.

95. The orders of the first twelve classes are founded upon the number of *Pistils*.

92. What general name is given to the first twenty classes, and what are the plants of the twenty-first class called?

93. What have you now been taught?

94. How can you best learn to distinguish the different orders in each class?

95. On what are the orders of the first twelve classes founded?

96. The orders are named by prefixing Greek numerals to the word *GYNIA*, signifying pistil.

ORDERS.

	<i>Names.</i>	<i>No. of pistils.</i>
97.	1. MONO-GYNIA,	1.
	2. DI-GYNIA,	2.
	3. TRI-GYNIA,	3.
	4. TETRA-GYNIA,	4.
	5. PENTA-GYNIA,	5.
	6. HEXA-GYNIA,	6. <i>this order seldom found</i>
	7. HEPTA-GYNIA,	7. <i>this still more unusual</i>
	8. OCTO-GYNIA,	8. <i>very rare.</i>
	9. ENNEA-GYNIA,	9. <i>very rare.</i>
	10. DECA-GYNIA,	10.
	13. POLY-GYNIA,	<i>over ten pistils.</i>

The classes vary as to the number of orders which they contain.

98. The orders of the 13th class, *Didynamia*, are but two.

1. GYMNOSPERMIA. From GYMNO, signifying naked, and SPERMIA, signifying seed, implying that the seeds are not enclosed, *lying in the calyx.*

2. ANGIOSPERMIA. From ANGEION, signifying bag or sack, added to SPERMIA, implying that the seeds are enclosed, *seeds numerous in a capsule.*

99. The orders of the 14th class, *Tetradynamia*, are two both distinguished by the form of the fruit.

1. SILICULOSA. Fruit, a *silicula*, or *roundish pod.*

2. SILIQUOSA. Fruit, a *siliqua*, or *long pod.*

100. The orders of the 15th and 16th classes, are founded on the number of stamens, that is, on the characters of the first twelve classes, and they have the same names; as *Monandria*, &c.

101. The 17th class, *Syngenesia*, has its five orders distinguished by different circumstances of the florets, as:

1. EQUALIS. Stamens and pistils *equal*, or in proportion, that is, each floret has a *stamen*, a *pistil*, and one seed. Such florets are called *perfect*.

96. How are these orders named?

97. Repeat the names of the orders.

98. What are the orders of the 13th class?

99. What are the orders of the 14th class?

100. In what classes are the orders founded upon the number of stamens?

101. What are the orders of the seventeenth class?

2. **SUPERFLUA.** Florets of the disk perfect, those of the ray containing *only pistils*, which without stamens are *superfluous*.
3. **FRUSTRANEA.** Florets of the disk perfect, of the ray neutral, or without the stamen or pistil; therefore *frustrated*, or useless.
4. **NECESSARIA.** Florets of the disk staminate, of the ray pistillate; the latter being *necessary* to the perfection of the fruit.
5. **SEGREGATA.** Florets *separated* from each other by partial calyxes, or each floret having a perianth.

102. The orders of the 18th, 19th, and 20th classes, like those of the 15th and 16th, depend on the number of stamens.

103. The orders of the 21st class, Cryptogamia, constitute six natural families.

1. **FILICES.**—includes all *Ferns*, having the fruit on the leaves.
2. **MUSCI.**—Mosses.
3. **HEPATICÆ.**—Liverworts, or succulent mosses.
4. **ALGÆ.**—Sea-weeds, and frog spittle.
5. **LICHENS.**—Lichens, found growing on the barks of old trees, old wood, &c.
6. **FUNGI.**—Mushrooms, mould, blight, &c.

104. No confusion is produced in taking the character of some classes, for orders in others; for example: if you have a flower with ten stamens, *united by their filaments into one set*, you know by the definition of the classes that it belongs to the class Monadelphia, you can then, because it has ten stamens, place it in the order Decandria of the same class.

Having explained the principles on which the artificial classes and orders are founded, we will now place them before you, in a synoptical or general view.

105. "SYNOPSIS OF THE CLASSES AND ORDERS OF LINNÆUS."*

	CLASSES.	ORDERS.
No. stamens	{ 1. MONANDRIA, 1 stamen. 2. DIANDRIA, 2. 3. TRIANDRIA, 3. 4. TETRANDRIA, 4. 5. PENTANDRIA, 5.	} Number of styles, if styles are wanting, number of sessile stigmas. Monogynia, 1. style, or one sessile stigma. Digynia, 2. Trigynia, 3. Tetragynia, 4. Pentagynia, 5. Hex-

* We say of *Linnaeus*, because there are other systems of classing plants, though none so generally adopted, or so proper for the learner.

102. On what do the orders of the three following classes depend?
103. What are the orders of the class Cryptogamia?
104. Does any confusion follow from taking the characters of some classes, for orders in other classes?

No. stamens	{ 6. HEXANDRIA, 6. 7. HEPTANDRIA, 7. 8. OCTANDRIA, 8. 9. ENNEANDRIA, 9. 10. DECANDRIA, 10.	} agynia, 6. Heptagynia, 7. Octogynia, 8. Enneagynia, 9. Decagynia, 10. Polygynia, any number over 10.			
			Number and Position.	{ 11. ICOSANDRIA, over 10 stamens, on the calyx. 12. POLYANDRIA, many stamens, not on the calyx.	} 1. Gymnospermia, seeds naked. 2. Angiospermia, seeds in capsules.
			Connexion of the Stamens by filaments or anthers.	{ 15. MONADELPHIA, filaments united in 1 set. 16. DIADELPHIA, filaments united in 2 sets. 17. SYNGENESIA, anthers united—flowers compound.	} Characters and names of preceding classes. As, 1. Monandria, 2. Diandria, 3. Triandria, 4. Tetrandria, 5. Pentandria, 6. Hexandria. Disk and ray florets compared. 1. Æqualis, 2. Superflua, 3. Frustranea, 4. Necessaria, 5. Segregata.
Invisible or Caducous.	{ 21. CRYPTOGAMIA, stamens invisible, wanting, or very caducous.	} Natural families. 1. Filices, 2. Musci, 3. Hepaticæ, 4. Algæ, 5. Lichens, 6. Fungi.			

NOTE.—The teacher cannot too much insist upon a thorough knowledge of the names and characteristics of the classes and orders.

105. You may now repeat the names of all the classes, with their orders.

CHAPTER VI.

Best method of learning Technical terms—Organized and of inorganized Beings—The Root.

106. WHEN you began to analyze plants, you were made acquainted with the first ten classes, because these are the most simple and easy to learn. But as you have now learned all the classes and orders, it is necessary that you should understand that the best method of analyzing a plant, is to begin by comparing it with the description of the last class, and if it does not belong there, to go on to the lower classes.

107. As you proceed in your Botanical studies, you will find it necessary to look out many words in the vocabulary, which is attached to the book you are now studying. In fact, the language of Botany is new to you, and you must make use of a dictionary, as if you were studying a new language.

108. It used to be considered necessary for a pupil in the first place to learn to repeat the hard words, or what are called the technical terms, but this was tedious and discouraging, and therefore Botany was thought to be a dry and difficult study.

109. But you can much better learn the technical terms by looking out their definitions as you have occasion to understand them; for instance, when you are examining some one plant, you find in the description of the species which belong to the genus to which you have traced it, one which is said to have leaves *radical*; by turning to the vocabulary, you find that this means growing from the root;* if your plant has its leaves growing from the stalk, you will perceive that they were not radical. If the leaves were said to be *serrate*, by turning to the vocabulary, you find that this means having notches upon the edge, like the teeth of a saw (from *serra*, a saw;) if your plant has its leaves without such notches, you would see that they were not serrate. If the term *glabrous* were used, you would find it meant smooth; if the leaves of your plant were rough, you would see that this word would not apply to them. If another species was described as having

* The root in Latin is *radix*, genitive *radicis*, from whence comes radical.

106. What is the best method of analyzing plants?
 107. Why must you use a vocabulary in studying Botany?
 108. Why was Botany formerly considered a dry study?
 109. What is the best way of learning technical terms?

cauline leaves, (that is, growing out of the stem) *entire*, or without notches, *hirsute*, or rough, you would perceive that this description corresponded with your plant.

110. Now you will remember the words *radical* and *cauline*, *serrate* and *entire*, *glabrous* and *hirsute*, by learning them as you proceed in your analysis, much better than by committing them to memory with their definitions.

111. The exercise of looking out words in the vocabulary, and at the same time examining a plant, is useful, by bringing into exercise your judgment and powers of reasoning.

112. Thus you see, my dear children, how much more agreeable and profitable is the study of Botany now than formerly. Authors and teachers are labouring to make it easy and pleasant for you to learn. Many of the thorns and briars which once hindered the young from gaining access to the garden of knowledge, have been removed by those who love and care for you. And will you not put forth a little power to make your own way towards this delightful region, where rich fruits of literature and science will be the reward of your efforts?

113. The analysis of plants is called *Practical Botany*. We commence with this, because we think you will feel an interest in plants when you have become acquainted with their place in the system of Linnæus, and that you will wish to know the uses of their various organs, the manner in which they receive food, and what it is which makes them living beings.

114. These things will now be explained to you, and with attention on your part, you will be enabled to understand many curious and interesting facts. Every kind of plant which you can find, should be carefully examined, and each part noticed. Will not this be better for your minds than idle play? Your parents and teachers will delight to gratify your fondness for botanical walks, and will perhaps sometimes be at leisure to accompany you.

115. I have said plants are *living beings*. When deprived of water or air, they droop and die, as you would do without food and drink.

110. How would you be likely to remember the terms radical, cauline, &c.?
 111. What effect does the analysis of plants have upon the mind?
 112. What encouragements have children to endeavour to gain knowledge?
 113. Why do we commence with Practical Botany?
 114. What can you learn by giving your attention to these things?
 115. Why do plants need water and air?

116. Plants are *organized* beings; that is, they are composed of parts which bear a mutual relation to each other; and which are all necessary to form a perfect individual.

117. Children, you too are organized beings; there is an intimate connexion between every part of your bodies. From your brain, a substance similar to it extends in every direction, forming nerves. If you prick your finger, or hurt your toe, the feeling which follows is communicated by nerves to your brain and by your brain to your mind.

118. If some organs of your body were topped off, for instance, your hands or feet, you would not be a perfect organized being; so if a plant were stripped of its leaves or deprived of its root, it would be an imperfect specimen of its kind.

119. But you might break a stone into many pieces, and each one would be as perfect a specimen of its kind as the whole stone was. This is because a stone is an *inorganized* being; that is, it does not consist of parts which have a mutual connexion and relation.

120. Plants, then, are living, organized beings; they are furnished with pores, by which they imbibe or suck their nourishment from surrounding bodies.

121. The principal organs of the plant are the Root, Stem, Leaves, and Flower.

122. The *Root* fixes the plant in the earth, and absorbs from it various substances necessary for its support.

123. The *Stem* conducts juices from the root to the leaves and branches; the divisions of the stem are *branches*; the divisions of these are *boughs*.

124. *Leaves* are to vegetables what lungs are to animals; by their means, the plant imbibes from the surrounding atmosphere, moisture, and a substance called *carbonic acid gas*; this is composed of two parts, oxygen and carbon; the latter is retained by the plant, and becomes a part of its own substance, while the oxygen, after being deprived of its carbon, is thrown back into the air.

116. Why are plants said to be organized beings?

117. Are there other organized beings besides plants?

118. When is an organized being imperfect?

119. Are stones organized beings?

120. How do plants derive nourishment from surrounding bodies?

121. What are the principal organs of the plant?

122. What is the use of the root?

123. What is the use of the stem?

124. What is the use of the leaves?

125. *Flower*. The parts of this have already been named. we shall speak more particularly of them hereafter.

126. The root, stem, and leaves, are organs necessary for the growth of the plant.

127. The flower contains within it the seed, and the parts necessary for its security and perfection.

Of the Root.

128. The root is that part which grows in the earth, and supports the plant in an upright position. It sends nourishment to every part. Some roots grow in water, and are called *aquatic*, (from *aqua*, water.)—some fix themselves upon other plants, and get their support from them,—these are called *parasites*.

129. The root gains its stock of food for the other parts of the plant by means of small tubes or fibres, which are called *radicles*, a word that signifies little roots.

Duration of Roots.

130. Roots, according to the age to which they live, are divided into three kinds; *annual*, *biennial*, and *perennial*.

131. *Annual roots* do not live over one year. They are raised from seed every season; this is usually sown in the spring; the plant comes up, bears its blossoms and fruit, and dies in autumn. Of this kind are poppies, beans, and cucumbers.

132. *Biennial roots* live two years. They do not blossom the first season; the next year they produce flowers and fruit, and the fruits die. You have probably seen cabbages carried into the cellar in the fall; the heads, which are only the leaves growing close together, are used for the table. The root, with the stalk upon it, is in the spring set out in the garden. Leaves soon spring from the stalk, these are used for salad; by and by flowers appear, the petals of which drop off, and the germ becomes a pod or *siliqua* containing the seed. The root then dies, and no care can restore it to life. The life of the plant

125. Do you recollect the parts of the flower, as mentioned in Chapter 2d?

126. What are the organs necessary for the growth of the plant?

127. What does the flower contain?

128. What are the different kinds of root?

129. What are the radicles?

130. How are roots divided with respect to age?

131. What are annual roots?

132. What are biennial roots?

seems to be expended upon the blossom and fruit. The onion, beet, and carrot, are biennial plants.

133. *Perennial roots* live many years; among them are the asparagus, dandelion, and grasses, and all trees and woody plants.

134. Climate and cultivation affect the duration of the roots of vegetables. Some perennial plants become annual by transplanting them into cold climates: the garden nasturtion, a perennial shrub or woody plant of South America, has become in our latitude an annual plant.

Form of Roots.

Fig. 12.



The shape of roots is different in different kinds of plants; the most common form is the

135. *Branching root*, which is divided into many parts, like the branches of a tree; some of these branches extend deep into the earth, while others creep along its surface.—Roots that have been torn up have been known to

become branches covered with leaves, and branches buried in the earth have become roots, and sent out fibres or radicles.—The radicles are the real roots, as they imbibe, through pores, the moisture and salts which the earth affords for the nourishment of the plant.

Fig. 13.



136. *Fibrous roots* consist almost wholly of radicles. Most of the annual plants, and also the grasses, have roots of this kind. The fibres usually grow directly from the bottom of the stem; by observing them in a handful of grass, you can understand the description, better than by any drawing.

133. What are perennial roots?
134. What affect the duration of plant?
135. Describe branching roots.
136. Describe fibrous roots.

Fig. 14.



137. *Spindle roots* are large at the top, and tapering downwards, as carrots, radishes, &c.—This root has but few radicles, and is therefore not so well furnished with the means of gaining its food as some others. You could easily convince yourselves that the plant owes its food to these fibres, by taking two radishes, placing one in water until every part is covered except the radicles, and putting only the radicles of the other in water;—while the leaves of the former would soon droop and die, those of the latter would for some time remain fresh and green.

Fig. 15.

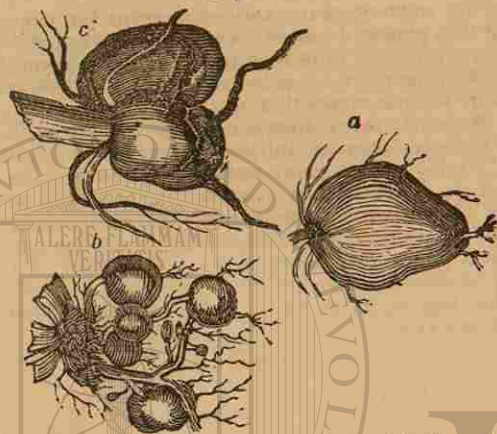


138. *Creeping roots*, instead of forcing their way downwards into the earth, extend almost horizontally along its surface; they send out many fibres, and new

plants spring forth from the roots in every direction around the original one. This kind of root is very hardy; it grows in sandy places, and is often useful in binding the soil, by spreading and weaving its fibres together. Holland, which is much exposed to the washing of its numerous lakes and bays, has its coasts bound together by such vegetable products.

137. Describe spindle roots.
138. What are creeping roots?

Fig. 16.



139. *Tuberous roots*, are hard, solid, and fleshy; they consist of knobs called *tubers*. Some have but one tuber, as the potato, which is shown at Fig. 16, *a*. In the artichoke, many tubers are strung together by fibres, as at *b*. In a kind of plants called *orchis*, the root has two tubers, resembling the parts into which a bean may be divided, as at *c*. You will perceive that they all are furnished with radicles. The tuber is a reservoir for the nourishment collected by the radicles. Such roots are *knobbed*, as in the potato; *oval*, as in the *orchis*; *abrupt*, as in the plantain.

140. *Granulated roots* consist of little *bulbs* or *tubers* strung together by a thread-like radicle, as in Fig. 17.

Fig. 17.

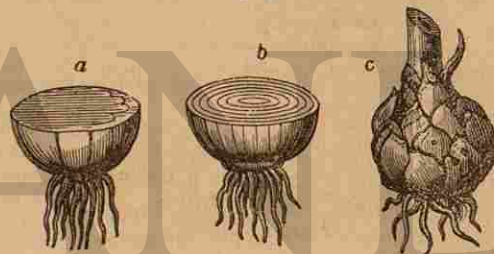


139. What are tuberous roots?
140. What are granulated roots?

141. *Bulbous roots* are fleshy, and of a bulbous or globular form. They enclose a plant, and in this respect resemble seeds. A plant thus protected within a bulb, is able to bear a degree of cold that it could not otherwise sustain. We see, then, the wisdom of Providence in so ordering things, that cold countries have more bulbous plants than warm ones.

142. Bulbous roots produce many of the most beautiful plants of our gardens; such as, tulips, lilies, snow-drops, and narcissi. Bulbs seem in many respects to resemble buds, and in some plants, they grow like stems or branches, as, in one kind of lily. In the *magical onion*, the bulbs or onions grow upon the stalk in clusters of four or five; they continue to enlarge until their weight brings them to the ground, where if they are suffered to remain, they soon take root. Bulbs are *solid*, as in the tulip, (Fig. 18, *a*) *scaly*, as in the lily, (*b*) and *coated*, as in the onion, (*c*).

Fig. 18.



143. Some plants grow without roots, these are called *air plants*. One of this kind, suspended from the ceiling of a room, will grow and blossom for years.

CHAPTER VII.

Different kinds of Stems.

144. THE stem is the body of the plant. This is hard and woody in some plants, and soft and watery in others. The oak

141. What are bulbous roots, and why are they most common in cold countries?
142. What is further remarked of bulbous roots?
143. Are there any plants without roots?
144. What is the stem?

and rose are *woody* plants, the lily and pink are *herbaceous*. Woody plants are divided into *trees* which have large stems called trunks and grow to a great height, and *shrubs* whose stems are smaller and which never grow very high.

145. The use of the stem is to support the branches, leaves, and flowers, and to convey to them, by means of certain tubes, such substances as the root absorbs from the earth. The stem also conveys back to the root, by means of another set of tubes, certain juices which have passed through changes in the leaves. If you water a plant with coloured liquid, the stem will in time show that it has ascended into it.

Fig. 19.



146. The *caulis*,* or proper stem, is seen in forest trees, in shrubs, and in most annual plants. The caulis is either simple, as in the white lily; or branching, as in the geranium; the branching, is the more common form. You have here, Fig. 19, the representation of a *caulis*, or proper stem, (a), a *peduncle*, or flower stalk, (b); and a *petiole*, or leaf stalk, (c). Plants with the real stem, or caulis, are called *cauline* plants.

147. Geologists, by examining rocks, and the petrifications they contain, have found that cauline plants were not created until after such as *herbaceous culms* or *stipes*.

* From the Greek *kaulos*, a stem.

145. What is the use of the stem?
 146. Describe the caulis or proper stem.
 147. What have geologists discovered with respect to the order of creation of plants?

Fig. 20.



148. *Culm*, or straw, (Fig. 20,) is the kind of stem which you see in grasses and rushes. The bamboo, sugar cane, and various species of reeds, have stems of the culm kind; some of them, particularly the bamboo, are known to attain to the height of forty feet. We can imagine something of the appearance which extensive plains of these lofty tropical reeds must present, gracefully bending to the slightest breeze, like our meadow grasses.

Fig. 21.



149. *Scape*. This is a stalk springing from the root, which bears the flower and fruit, but not the leaves; as the Dandelion, the Cowslip, and the Lily of the Valley, (a a Fig. 21). Plants with scapes are sometimes called *stemless* plants.

150. *Peduncle*, or flower stalk. This is a subdivision of the principal stem; it bears the flower and fruit, but not the leaves. When the peduncle is divided, each sub-division is called a *pedicel*.

151. When there is no peduncle or flower stalk, the flowers are said to be *sessile*, which means *sitting down* upon the main stem.

152. *Petiole*. The petiole or leaf-stalk, is a kind of *stalk*, or *pedicel*, supporting the leaf; it is usually green, and appears to be a part of the leaf itself. In most cases, the leaves and flowers are supported by distinct foot stalks, but sometimes one foot-stalk supports both the leaf and flower.

148. Describe the culm.
 149. What is a scape?
 150. What is a peduncle, and what is a pedicel?
 151. When are flowers said to be sessile?
 152. What is the petiole?

Fig. 22.



153. *Fronde*. Fig. 22. This is where the leaf appears to be a part of the stem, as in the common fern, which bears its flowers and fruit upon the back and edges of the leaf. The palm leaves are called fronds. Plants with fronds and stipes are sometimes called by the general name of *stiped-plants*.

Fig. 23.



154. By observations of geologists, it is ascertained that *stiped* plants were created before *cauline* ones; since petrifications of the former are found in the lower formations of the earth, while no remains of *cauline* plants are ever found in them. In this sketch of the fern, *a* represents the lower part of the frond, sometimes also called the *stipe*.

155. *Stipe*, is the stem or leafless part of a frond, or the stalk of a fungus or mushroom. The term is also applied to the slender thread, which in many of the compound flowers, elevates the hairy crown, with which the seeds are furnished, and connects it with the seed. Thus, in the seed of the Dandelion, which is here represented, the column (Fig. 23, *a*) standing on the seed (*b*) and elevating the down (*c*) is the *stipe*.

153. Describe the frond.

154. What plants, according to the observations of geologists, were first created?

155. What is a *stipe*?

Fig. 24.



156. Here is a mushroom, or Toadstool, with the cap, (Fig. 24, *d*) elevated by its stem or *stipe* (*e*).

157. *Herbaceous* stems usually die every year; in some cases, when the root lives more than one year, the stem is annual, as in the Tulip.

158. *Woody* stems are composed of tough fibres, as the oak, currant-bush, &c. Plants with woody stems are generally much longer lived than herbaceous plants.

159. *Pithy* stems, like the elder, are in their centre composed of a soft substance, called *medulla*, or marrow. Some stems are *solid*, as the Box; *hollow*, as the Onion; and *corky*, as the Cork tree.

160. The stem is either *simple*, or *divided* into branches. The divisions of the main stem are called *branches*; the divisions of the branches are called *branchlets*, or *boughs*.

161. Branches sometimes grow without any regular order; sometimes they are *opposite*; sometimes *alternate*; and sometimes, as in certain species of the pine, they form a series of rings around the trunk. Some branches are erect, as in the poplar; others are pendant, as in the willow; some, as in the oak, form nearly a right angle with the trunk.

162. A remarkable phenomenon is described by travellers as being exhibited by the stems of the Banyan tree of India, called the *Ficus Indicus*; these stems throw out fibres, which descend and take root in the earth. In process of time, the stems become large trees; and thus from one primitive root, is formed a little forest. The tree is called by various names; as the Indian-God-tree, the arched-Fig-tree, &c. The Hindoos plant it near their temples, and in many cases the tree itself serves them for a temple. Milton speaks of this tree as the one from which Adam and Eve obtained leaves to form themselves garments; he says:

156. What is the stem of the mushroom called?

157. What are herbaceous stems composed of?

158. What are woody stems?

159. What other kinds of stems are there?

160. What are branches and boughs?

161. What are the different appearances presented by branches?

What is said of the Banyan tree?

"It was not the fig-tree renowned for fruit."

"Such as at this day to Indians known
In Malabar or Decan, spreads her arms,
Branching so broad and long, that in the ground
The bended twigs take root, and daughters grow
About the mother tree, a pillar'd shade
High over-arched, and echoing walks between."

You have here a picture of this wonderful tree, which is said to have given shelter to an army of several thousand men

Fig. 25.



Ficus Indicus, or Banyan tree.

CHAPTER VIII.

Buds.

163. Most leaves and flowers proceed from scaly coverings called buds. The scales cover each other closely; the outer ones being dry and hard, the inner moist and covered with down: they are also furnished with a kind of resin, which prevents the embryo or future plant from being injured by too much moisture. Buds have been known to lie for years in water without injury to the infant plant, or branch, within.

164. The sap is the great fountain of vegetable life; by its agency, new buds are yearly formed to replace the leaves and flowers destroyed by the severity of winter.

165. The bud is usually a cone-like protuberance formed by

163. What do most leaves and flowers proceed from?

164. By what agency are new buds formed?
the bud usually make its appearance?

the swelling of the germ: and as for this purpose the agency of an additional quantity of sap is needed, we see the bud appearing at the axils of leaves, or the extremities of branches and stems, where there is an accumulation of this fluid. If you plant a slip of *Geranium*, you will observe that it either sprouts from the axil of a leaf, or from knots in the stem which answer the same purpose as the leaf, by slightly interrupting the circulation of juices, and thus affording an accumulation of sap necessary for the production of a new shoot.

166. Herbs and shrubs have buds, which usually grow and unfold themselves in the same season, and are destitute of scales; while the buds of trees are not perfected in less than two seasons, and in some cases they require years for their full development.

167. You have, no doubt, observed in the spring, the rapid growth of the leaves and branches of trees; and perhaps, have also noticed, that as summer advances, the progress of vegetation seems almost to cease, and that new leaves and branches do not come forth as before; but you may not have known, that instead of resting in her operations, nature is now busy in providing for the next year; that she is turning the vital energies of the plants to the formation of buds. Those little embryo plants, so nicely wrapped up in downy scales as to be able to bear the coldness of the winter, in the ensuing spring will come forth from their snug retreats, and taking the places of the leaves which had withered in autumn, will delight us with new verdure and beauty.

168. You may here see a representation of two scaly buds; one of which appears as if cut vertically, in order to show the germ or embryo, which is enclosed by the scales.



169. The term bud, in common language, extends to the rudiments of all plants, whether with scales or without, which originate upon other living plants. Buds with scaly coverings are chiefly confined to the trees of cold countries. In the northern part of the United States, there are few trees which can endure the cold weather, without this security. In Sweden, it is said there is but one shrub* destitute of scaly buds

* A species of *Rhamnus*, which grows under trees in marshy forests.

166. Do herbs and shrubs have buds?

167. At what period of the year are buds formed?

168. What does Fig. 26 represent?

169. In what countries are the trees mostly furnished with scaly buds?

and this from the peculiarity of its situation, is always protected from the inclemencies of the weather.

170. That there is, in reality, a difference in the nature of vegetables as well as of animals, is very apparent; an orange tree will not form scales to protect its buds from cold; neither can the most delicate tropical animal resist the rigours of a polar climate.

171. There are cases, however, in which plants, as well as animals change their habits. The horse-chestnut, in India, its native climate, unfolds its leaves to the atmosphere, without receiving any check in their development; in a colder climate, the leaves, in attempting to unfold, are checked in their progress, degenerate into scales, and form buds.

172. Of the *bud*, there are three sorts; the *flower-bud*, *leaf-bud*, and *mixed-bud*.

173. 1st. The *flower-bud*, is of a short round form, and contains the rudiments of one or several flowers folded over each other, and surrounded with scales. It is often found at the extremities of small short branches; this is the kind of bud which is employed in grafting or inoculating. This operation is performed by cutting into the bark of another tree, and placing a bud in the aperture; the sap of the tree flows to it, and forms around it a substance which connects the bud to itself; in this situation it shoots forth, and becomes a fruit-bearing branch.

174. 2d. The *leaf-bud* contains the rudiments of several leaves without flowers; it is usually longer and more pointed than the *flower-bud*.

175. 3d. The *mixed-bud* contains both leaves and flowers. In the peach we have examples of the first two divisions, the leaf and flower-bud being distinct; in the lilac they are enclosed together in the same bud.

176. You have now seen the manner in which buds commence their existence; and how they gradually unfold themselves until they become, in their turn, branches covered with leaves and flowers. In considering this subject, you cannot but have been impressed with a sense of the goodness of that

170. Does there appear to be any difference in the nature of vegetables?

171. Do plants ever change their habits?

172. How many kinds of buds are there?

173. Describe the flower-bud.

174. Describe the leaf-bud.

175. Describe the mixed-bud.

176. What reflections arise when considering the progress of vegetable life?

great Being, who watches with unceasing care over his vast creation. To observe the progress of life, whether in the vegetable or animal kingdom, is highly interesting to an investigating mind;—but here the power of man can achieve nothing; he may plant and water, but God alone giveth the increase.

177. A bud lives; an infant lives; both are destined to grow and to pass through physical changes; but the bud, although active with a principle of life, knows not its own existence; while the infant becomes conscious of its own powers and faculties, capable of loving those who have contributed to its well-being, and of adoring the great Author of its existence.

CHAPTER IX.

Of Leaves.

78. The leaf is generally a thin, flat organ, consisting of an expansion of the fibres of the bark, connected by a substance which is called the *cellular tissue*; the whole is covered with a green coat or skin called the *cuticle*.

179. Leaves are furnished with pores for exhaling and inhaling gases; and as they present to the air a more extended surface than all other parts of the plant, they are of great utility to the vegetable, by imbibing suitable nourishment, and throwing off such gases as would be useless or injurious.

180. We have seen how the bud is formed, and by what curious means the principle of vegetable life which it contains is preserved and protected through the cold and dampness of winter. In the spring, when the sun has turned his course towards the north, re-crossed the equator, and is advancing towards the tropic of Cancer,* the vegetable world in our region quickened by its stimulating warmth, begins to awaken from its dormant state; the leaf-buds expand, and soon bursting their envelopes, the green leaves come forth.

* It is here presumed that the pupil has been instructed in the apparent course of the sun, as explained in the common school geographies.

177. What comparison may be made between a bud and an infant?

178. What is the leaf?

179. How do leaves inhale and exhale gases?

180. When do the leaves usually appear?

and this from the peculiarity of its situation, is always protected from the inclemencies of the weather.

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171. There are cases, however, in which plants, as well as animals change their habits. The horse-chestnut, in India, its native climate, unfolds its leaves to the atmosphere, without receiving any check in their development; in a colder climate, the leaves, in attempting to unfold, are checked in their progress, degenerate into scales, and form buds.

172. Of the *bud*, there are three sorts; the *flower-bud*, *leaf-bud*, and *mixed-bud*.

173. 1st. The *flower-bud*, is of a short round form, and contains the rudiments of one or several flowers folded over each other, and surrounded with scales. It is often found at the extremities of small short branches; this is the kind of bud which is employed in grafting or inoculating. This operation is performed by cutting into the bark of another tree, and placing a bud in the aperture; the sap of the tree flows to it, and forms around it a substance which connects the bud to itself; in this situation it shoots forth, and becomes a fruit-bearing branch.

174. 2d. The *leaf-bud* contains the rudiments of several leaves without flowers; it is usually longer and more pointed than the *flower-bud*.

175. 3d. The *mixed-bud* contains both leaves and flowers. In the peach we have examples of the first two divisions, the leaf and flower-bud being distinct; in the lilac they are enclosed together in the same bud.

176. You have now seen the manner in which buds commence their existence; and how they gradually unfold themselves until they become, in their turn, branches covered with leaves and flowers. In considering this subject, you cannot but have been impressed with a sense of the goodness of that

170. Does there appear to be any difference in the nature of vegetables?

171. Do plants ever change their habits?

172. How many kinds of buds are there?

173. Describe the flower-bud.

174. Describe the leaf-bud.

175. Describe the mixed-bud.

176. What reflections arise when considering the progress of vegetable life?

great Being, who watches with unceasing care over his vast creation. To observe the progress of life, whether in the vegetable or animal kingdom, is highly interesting to an investigating mind;—but here the power of man can achieve nothing; he may plant and water, but God alone giveth the increase.

177. A bud lives; an infant lives; both are destined to grow and to pass through physical changes; but the bud, although active with a principle of life, knows not its own existence; while the infant becomes conscious of its own powers and faculties, capable of loving those who have contributed to its well-being, and of adoring the great Author of its existence.

CHAPTER IX.

Of Leaves.

78. The leaf is generally a thin, flat organ, consisting of an expansion of the fibres of the bark, connected by a substance which is called the *cellular tissue*; the whole is covered with a green coat or skin called the *cuticle*.

179. Leaves are furnished with pores for exhaling and inhaling gases; and as they present to the air a more extended surface than all other parts of the plant, they are of great utility to the vegetable, by imbibing suitable nourishment, and throwing off such gases as would be useless or injurious.

180. We have seen how the bud is formed, and by what curious means the principle of vegetable life which it contains is preserved and protected through the cold and dampness of winter. In the spring, when the sun has turned his course towards the north, re-crossed the equator, and is advancing towards the tropic of Cancer,* the vegetable world in our region quickened by its stimulating warmth, begins to awaken from its dormant state; the leaf-buds expand, and soon bursting their envelopes, the green leaves come forth.

* It is here presumed that the pupil has been instructed in the apparent course of the sun, as explained in the common school geographies.

177. What comparison may be made between a bud and an infant?

178. What is the leaf?

179. How do leaves inhale and exhale gases?

180. When do the leaves usually appear?

181. Some plants are destitute of leaves; they are then called *Aphyllous*, which term signifies *wanting leaves*.

182. In determining the species of plants, the leaves are much regarded. Specific names are often given from some circumstance of the leaf; for example, the *HEPATICIA triloba* is that species of the Hepatica which has leaves with three divisions called *lobes*; the *VIOLA rotundifolia* is a species of violet with round leaves.

183. A knowledge of the various appearances presented by leaves, is of great importance; in order to become acquainted with all their varieties, considerable practice in the analysis of plants is necessary. Engravings will assist you in understanding definitions, but you must consult nature. There are many terms to express the varieties observable in leaves; we shall here explain some of the most important.

184. 1. *Seminal* leaves are those which come up with the plant when it first appears above the surface of the earth; as in the garden bean: these leaves are the cotyledons, or lobes of the seed, which, after nourishing the young plant, decay.

185. 2. *Primordial* leaves succeed the seminal ones, and resemble them in position, form, and size. The primordial leaf, according to the fanciful idea of a French botanist, is a sketch which nature makes before the perfection of her work.

186. 3. *Characteristic* leaves are found in the mature state of the plant; or according to the idea above advanced, nature here perfects her design.

187. It is not always, however, that this process with regard to change of leaves takes place; as in many cases the proper, or characteristic leaf, is the only one which appears.

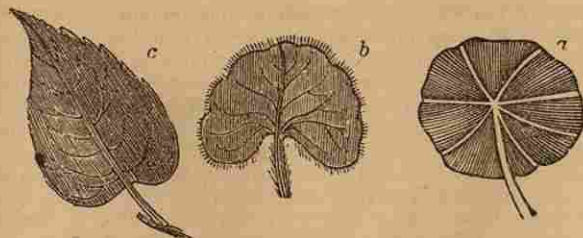
188. There are many terms to express the *mode of insertion* of the leaf; such as *radical*, growing from the root (*radix*.) *cauline*, growing from the stem (*caulis*.) &c.

189. To express the *position* of leaves, we find the terms. *opposite*, *alternate*, &c.

181. What are plants destitute of leaves called?
 182. Is the leaf noticed in determining the species of plants?
 183. What is the best way of learning the varieties of leaves?
 184. Describe the seminal leaf.
 185. Describe the primordial leaf.
 186. Describe the characteristic leaf.
 187. Does this process with respect to the change of leaves always take place?
 188. What are some of the terms which express the mode of insertion of the leaf?
 189. What terms express the position of the leaf?

190. The *form* of the leaf is expressed by various terms, borrowed from the names of different objects; as *digitate*, (from *digitus*, the finger,) &c. For the explanation of these different terms you must consult the vocabulary as often as you find those you do not understand. We will, however, illustrate some of the most common forms of simple leaves

Fig. 27.



191. *Orbicular*, or the round leaf; the Nasturtion affords an example of this kind; (see Fig. 27, a;) this is also *peltate*, having its petiole inserted into the centre of the leaf, and thus resembling a shield.

192. *Reniform*, (from the Latin *ren*, the kidney,) or as it is sometimes called *kidney-form*; the Ground-ivy (*Glechoma*) has a leaf of this kind. (See Fig. 27, b;) It is *crenate*, or has a margin with scalloped divisions, *ciliate*, being fringed with hairs like eyelashes.

193. *Cordate*, (from the Latin *cor*, the heart,) or *heart-shaped*. Fig. 27, (c,) represents a cordate leaf with an *accuminated* point; that is, acute and turned to one side; the margin is *serrated*; an example of this kind of leaf may be seen in one species of the Star-flower, *Aster cordifolium*.

Fig. 28.



190. What terms express the form of the leaf?
 191. Describe an orbicular leaf.
 192. What is a reniform leaf?
 193. What is cordate?

194. *Ovate, obovate, oval*; these are terms derived from the Latin *ovum*, an egg; suppose the figure at 28, *a*, to represent an egg, you observe that one end is broader than the other, now if to this broad end you add a petiole prolonging it into a mid-rib with some lateral divisions, you have, as at *b*, the representation of an *ovate* leaf. If the petiole, were placed at the narrowest end, it would be an *obovate* leaf. An *oval* leaf (*c*) is when both the ends are of equal breadth. When the length is much greater than the breadth, the leaf is said to be *eliptical*, as at *d*.

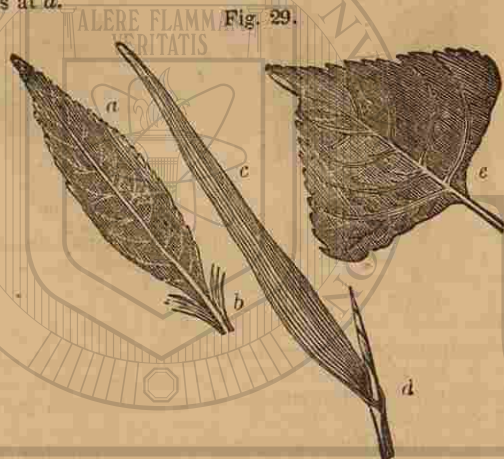


Fig. 29.

195. *Lanceolate*, this kind of leaf may be seen in the peach tree; it is represented in Fig. 29, *a*; this has a *serrulated* or slightly notched margin; at *b*, may be seen the cleft *stipules*, or appendages of the leaf.

196. *Linear*, as the grasses and Indian corn, Fig. 29, *c*, represents a leaf of this kind; it is *sheathing*, or encloses the stem by its base, as may be seen at *d*.

197. *Deltoid*, from the Greek letter delta Δ ; this kind of leaf is represented at *e*, Fig. 29; the Lombardy poplar affords an example of the same.

194. Describe the terms ovate, obovate, and oval.
195. Describe a lanceolate leaf.
196. What is a linear leaf?
197. What is a deltoid leaf?



198. *Sagittate*, (from *sagitta*, an arrow,) or arrow shaped leaf; this is represented at *a*, Fig. 30; the *Sagittaria*, or Arrow-head, an aquatic plant, affords an example of this leaf.

199. *Acerose*, or needle shaped; this is represented at *b*, Fig. 30. Leaves of this kind are mostly clustered together, as in the pine; they are *subulate*, or pointed like a shoemaker's awl; they are *rigid*, or stiff, and *evergreen*.

200. Trees with acerose leaves, are usually natives of mountainous or northern regions; any other kind of leaves would in these situations be overpowered by the weight of snow or the violence of the tempests; but these admit the snow and wind through their interstices; their many points or edges, presented even to a gentle breeze, produce a deep, solemn murmur in the forest; and when the storm is abroad, and the tempest high.

"The loud wind through the forest wakes,
With sound like ocean's roaring, wild and deep,
And in yon gloomy pines strange music makes."

198. What is a sagittate leaf?
199. What is an acerose leaf?
200. What is observed of trees with acerose leaves?

The poet Buras, in describing such a scene, says: "this is my best season for devotion: my mind is wrapt up in a kind of enthusiasm to Him who, in the pompous language of the Hebrew bard, 'walks on the wings of the wind.'"

201. *Lyrate*, differs from pinnatifid in having its terminating segment broader and more circular. See Fig. 30, c.

202. *Pinnatifid*, may be seen at Fig. 30, d; leaves of this form are sometimes finely divided, like the teeth of a comb; they are then said to be *pectinate*.

203. *Palmate*, or hand shaped, (Fig. 31, a;) one species of the Passion-flower affords a good example of this kind of leaf. The oblong segments like fingers, arise from a space near the petiole, which may be considered as resembling the palm of the hand.

204. *Digitate*, or fingered leaf, (Fig. 31, b,) differs from the palmate leaf in having no space resembling the palm of a hand; but several distinct leaflets arise immediately from the petiole as may be seen in the Horse-Chestnut.

205. *Connate*, (Fig. 31, c;) the bases of opposite leaves are united so as to appear one entire leaf.

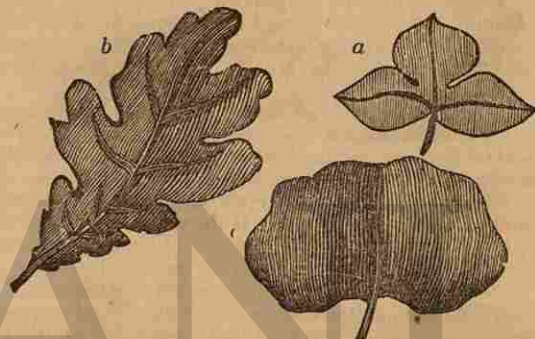
Fig. 31.



201. Describe a lyrate leaf.
 202. What is a pinnatifid leaf?
 203. What does palmate signify?
 204. What is a digitate leaf?
 205. What is a connate leaf?

206. *Lobed*; when leaves are deeply indented at their margins, they are said to be lobed, and according to the number of these indentures, they are said to be *three lobed*, *four lobed*, &c. Fig. 32, a, represents a three lobed leaf, as may be seen in the *Hepatica triloba*.

207. *Sinuate*, from the Latin *sinus*, a bay; this term is applied to leaves which have their margins indented with deep, roundish divisions, as at b, Fig. 32.
 Fig. 32.



208. *Emarginate*, denotes a slighter indentation than sinuate, as at c, Fig. 32.
 Fig. 33.

209. *Stellated*, or whorled; (from *stella*, a star;) this term is applied both to leaves and flowers, and relates to the manner in which they radiate from the stem, as in Fig. 33.

210. *Tubular*, there are many varieties of this kind; the leaf of the onion is a complete tube; the *Saracenia*, or side-saddle flower, has the sides of its leaf united, forming a cup which is found filled with liquid, supposed to be a secretion from the vessels of the plant. In some countries of the torrid zone is the



206. What does lobed signify?
 207. What is sinuate?
 208. What is emarginate?
 209. What does stellated signify?
 210. What leaves are called tubular?

wild pine, *Tillandsia*, the leaves of which are hollowed out at their base, so as to be capable of containing more than a pint of liquid. A traveller says, "by making an incision into the base of this leaf, and collecting the water in our hats, we could obtain a sufficient supply for the relief of the most intense thirst." The fluid is not a secretion from the plant, but is deposited during the rainy season.

Fig. 34.



211. The Pitcher-plant, (*Nepenthes distillatoria*), Fig. 34, affords a most singular tubular receptacle in an appendage to its lanceolate leaf; beyond the apex of the leaf *a*, the mid-rib extends in the form of a tendril; at the extremity of this tendril is the cylindrical cup or pitcher *b*, about six inches in length, and one and a half in diameter; it is furnished with a lid, *c*. This is usually found filled with pure water, supposed to be a secretion from the plant. Insects which creep into this cup are drowned in the liquid, except a small species of shrimp, which lives by feeding on the others. The Pitcher-plant is a native of Ceylon, where it is called monkey-cup, on account of its being frequented by these animals for the purpose of quenching their thirst.

Compound Leaves.

212. When several leaflets grow on one petiole, the whole is termed a *compound leaf*, as in the Rose.

Fig. 35.



213. *Pinnate*; at Fig. 35, *a*, represents the petiole or principal leaf stalk; from this, spring out other divisions, each bearing a leaflet; *b, b*, represent the stipules or appendages; the whole taken together forms one compound pinnate leaf. The term pinnate is from the Latin *pinna*, a wing or pinion.

214. *Binate*; when two leaflets only spring from the petiole, as in Fig. 35, *c*.

Fig. 36.



215. *Ternate*; when three leaflets arise from the petiole, as Fig. 36, *a*.

216. *Bi-ternate* is a second division of threes, as Fig. 36, *b*.

217. *Tri-ternate* is a third division of threes, as Fig. 36, *c*.

Fig. 37.



218. *Decomposed*, is when a pinnate leaf is again divided, or has its leaves twice compound, as Fig. 37, *a*. At *b*, is a representation of thrice compound leaves.

219. Leaves vary in size, from the small leaves of some of

-
213. What does pinnate signify?
 214. What is binate?
 215. When is a leaf said to be ternate?
 216. When bi-ternate?
 217. When tri-ternate?
 218. When is a leaf said to be decomposed?
 219. What is remarked of leaves with respect to size?

the forest trees of our climate, to the spreading palms and bananas of the torrid zone. As we approach the torrid zone, the leaves increase in magnitude; we can however scarcely credit the report of travellers, who say, that the Talipot tree, in the island of Ceylon, produces leaves of such size, that twenty persons may be sheltered by one single leaf. Although this account may be exaggerated, there is no doubt of the fact, that the leaves of the torrid zone are of a wonderful size; and that whole families often dwell under the branches of these trees. Here we see the care of an ever kind Providence, which, in countries parched the greater part of the year by a vertical sun, has formed such refreshing shelters.

220. Mungo Park, in his travels in Africa, remarks upon the many important uses of palm leaves; serving as coverings to cottages, as baskets for holding fruit, and umbrellas for defence against rain or sun. These leaves are a good substitute for paper, and were so used by the eastern nations. Many suppose that the scriptures of the Old Testament were originally committed to palm leaves.

221. The magnitude of leaves often bears no proportion to the size of the plants to which they belong. The Oak, and other forest trees, bear leaves, which appear very diminutive when compared with the Cabbage, or Burdock.

222. Leaves, with respect to *duration*, are, *Deciduous*, or such as fall before the end of summer; *Deciduous*, falling at the commencement of winter; this is the case with most vegetables, as far as 30° or 40° north of the equator; *Persistent*, or permanent, remaining on the trees amidst changes of temperature, as the leaves of the Pine and Box; *Evergreen*, preserving their greenness through the year, as the Fir-tree and Pine, and generally all cone-bearing and resinous trees; these renew their leaves annually, but the young leaves appearing before the old ones decay, the plant is always green.

223. In our climate the leaves are mostly deciduous, returning in autumn to their original dust, and enriching the soil from which they had derived their nourishment. In the regions of the torrid zone, the leaves are mostly persistent and evergreen; they seldom fade or decay in less time than six years; but these same trees, removed to our climate, some

220. What is said of the uses of palm leaves?

221. Does the size of the leaf correspond to the size of the plant?

222. How are the leaves divided with respect to duration?

223. What is observed of the leaves of our climate with respect to duration and what is said of the leaves of the torrid zone?

times become annual plants, losing their foliage every year.—The Passion-flower is a perennial evergreen in southern climates, though annual in ours.

224. Leaves have not that brilliancy of colour which is seen in the corolla or blossom; but the beauty of the corolla, like most other external beauty, has only a transient existence; while the less showy leaf remains fresh and verdant, after the flower has withered away.

225. The substance of leaves is so constituted as to absorb the other rays of light, and reflect the *green* ray; this colour is, of all others, best adapted to the extreme sensibility of our organs of sight. Thus, in evident accommodation to our sense of vision, the ordinary dress of nature is of the only colour upon which our eyes can, for any length of time, rest without pain.

226. But although green is almost the only colour which leaves reflect, its variety of shades is almost innumerable.

“No tree in all the grove but has 'tis charms,
Though each its hue peculiar; *paler* some,
And of a *wannish gray*; the willow such,
And poplar, that with silver lines his leaf;
And ash far stretching his umbrageous arm;
Of *deeper green* the elm; and *deeper still*,
Lord of the woods, the long surviving oak.”*

The contrast between their shades, in forests, where different families of trees are grouped together, has a fine effect, when observed at such a distance, as to give a view of the whole, as forming one mass.

CHAPTER X.

Leaves.—Appendages.

227. LEAVES perform a very important office, in sheltering and protecting the flowers and fruit. The fact of their inhaling or absorbing air, is thought to have been proved, by placing a plant under a bell glass exhausted of air, permitting the *leaves only* to receive the influence of air;† the plant remained

* Cowper.

† Natural philosophy will inform you of the manner in which a glass vessel may be thus exhausted by means of the air-pump.

224. What is observed of leaves with respect to brilliancy of colour?

225. What coloured ray do leaves reflect?

226. What is said of the different shades of green which may be seen in leaves?

227. What are some of the offices of leaves?

thrift in this situation for a length of time; but as soon as the whole plant was placed under the receiver, it withered and died.

228. The upper surface of leaves is usually of a deeper green, and supposed to perform a more important part in respiration, than the under surface. The upper surface repels moisture you may perceive, by examining a cabbage leaf after a shower or heavy dew, that the moisture is collected in drops, but has no appearance of being absorbed by the leaf. It has been found that the leaves of plants, laid with their upper surface upon water, wither almost as soon as if exposed to the air, although the leaves of the same plants, placed with their under surfaces upon water, retain their freshness for some days.

229. But few among the vegetable tribes are destitute either of leaves, or green stems, which answer as a substitute. The *Monotropa*, or Indian pipe, is of a pure white, and looks as if made of wax. Mushrooms are also destitute of any green herbage. It is not known in what manner the deficiency of leaves is made up to these vegetables.

230. The period in which any species of plant unfolds its leaves, is termed *Fruondescence*. Linnæus paid much attention to this subject; he stated as the result of his investigations, that the opening of the leaf-buds of the Birch tree, (*Betula*,) was the most proper time for the sowing of barley. The Indians of our country had an opinion, that the best time for planting Indian corn, was when the leaves of the white oak first made their appearance; or, according to their expression, are of the size of a squirrel's ears.

231. One of the most remarkable phenomena of leaves, is their *irritability*, or power of contraction, upon coming in contact with other substances. Compound leaves possess this property in the greatest degree; as the foreign sensitive plant, and the American sensitive plant; these, if the hand is brought near them, seem agitated as if with fear; but as they are destitute of intelligence, we must attribute this phenomenon to some physical cause, perhaps the warmth of the hand, which produces the contractions and dilatations of the leaves.

232. The effect of light upon leaves is very apparent, plants being almost uniformly found to present their upper surfaces

228. In what respects do the upper and under surfaces of leaves differ?

229. What plants are destitute of leaves?

230. What is meant by the term *Fruondescence*?

231. What is said of the irritability of leaves?

232. What is said of the effect of light upon leaves?

to the side on which the greatest quantity of light is to be found. It has already been observed, that plants throw off oxygen gas; but for this purpose they require the agency of light.

233. *Carbonic acid gas* is a necessary food of plants; this consists of carbon and oxygen, and is decomposed by the agency of light; the carbon becomes incorporated with the vegetable, forming the basis of its substance, while the oxygen is exhaled and thrown off into the atmosphere.

234. Many plants close their leaves at a certain period of the day, and open them at another; almost every garden contains some plants, in which this phenomenon may be observed; it is particularly remarkable in the sensitive plant, and the tamarind tree. The folding up of leaves at particular periods, has been termed the *sleep* of plants; this may seem a singular term to apply to plants; but a celebrated botanist remarks, "this folding up of the leaves may be as useful to the vegetable constitution, as real sleep is to the animal."

235. Linnæus was led to observe the appearance of plants in the night, from the following circumstance, which occurred in raising the Lotus plant; he found one morning some very thrifty flowers, but at night they had disappeared; this excited his attention, and he began to watch the plants through the night, in order to observe the period of their unfolding. He was thus led to investigate the appearance of other plants in the night, and to observe their different manner of sleep.—He found that some folded their leaves together, some threw them back upon their stems, or exhibited other curious appearances.—This phenomenon has been attributed to the absence of light.

236. The following experiment was once made by a botanist; he placed the sensitive plant in a dark cave at midnight, and then lighted up the cave with lamps; the leaves which were before folded up suddenly expanded, and when on the following day the lights were extinguished, the leaves again closed.

237. The period at which the leaves fall off is termed the *Defoliation** of the plant. About the middle of Autumn, the leaves of all annual, and of many perennial plants, begin to lose their vigour, change their colour, and at length fall from their stems.

* From *de*, signifying to deprive of, and *folium*, leaf.

233. What is a necessary food of plants?

234. What is meant by the sleep of plants?

235. How was Linnæus led to observe the appearance of plants in the night?

236. What experiment was once made with the sensitive plant?

237. What is the defoliation of plants?

238. The "fall of the leaf" may be referred to two causes, the *death* of the leaf, and the *vital action of the parts to which it is attached*. If a whole tree is killed by lightning, or any sudden cause, the leaves will adhere to the dead branches, because the latter have not the energy to cast them off.

239. The richness and variety of colouring exhibited about the end of autumn, by American groves and forests, is splendid beyond the power of the painter to imitate. Yellow, red, and brown, are the most common colours of the dying leaf; but these colours vary from the brightest scarlet, and the deepest crimson, to different shades of yellow, from the deep orange to the pale straw colour.

Appendages to Plants.

240. Plants have a set of organs called by the general name of *appendages*. These we shall now describe.

Fig. 38.



wanting. In the garden violet, *Viola tricolor*, (Fig. 38, a, a,) the stipules are of that form called *lyrate pinnatifid*, while the true leaf (b) is oblong and crenate. The most natural situation of the stipules is in pairs, one on each side of the base of the footstalk, as in the sweet pea; some stipules fall off almost as soon as the leaves are expanded, but in general, they remain as long as the leaves.

242. *Prickles*, arise from the bark; they are sometimes straight, sometimes hooked, and sometimes forked. They are usually found upon the stem, as in the Rose; but in some cases they cover the petiole, as in the Raspberry; in others, they are

238. To what may the fall of the leaf be referred?

239. What is said of the appearance of American forests in the Autumn?

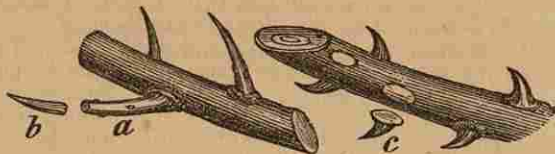
240. What organs have plants besides those already named?

241. Describe stipules.

242. Describe prickles.

found upon the leaf or the calyx, and in some instances upon the berry - as in the Gooseberry.

Fig. 39.



243. *Thorns*, seem to be a kind of short pointed stem, easily distinguished from prickles, as they grow from the woody part of the plant, while the prickle proceeds only from the bark. On stripping the bark from a rose-bush, the prickles will come away with it, but let the same experiment be made with a thorn bush, and although the bark may be separated, the thorn will still remain projecting from the wood.

244. In this drawing (Fig. 39) you will observe the thorn (a) to remain on the stem, while the bark (b) has been peeled off. In the prickle (c) the whole appears separated from the plant. Thorns in some plants have been known to disappear by cultivation. The great Linnæus imagined that the trees were divested of their natural ferocity and became tame. A more rational opinion is given by another botanist, viz.: that thorns are in reality buds, which a more favourable situation converts into luxuriant branches. But in some cases they do not disappear even under circumstances favourable to vegetation. Thorns have been compared to the horns of animals.

245. *Glands* are roundish, minute appendages, sometimes called tumours or swellings; they contain a liquid secretion, which is supposed to give to many plants their fragrance.— They are sometimes attached to the base of the leaf, sometimes they occur in the substance of leaves; as in the Lemon and Myrtle, causing them to appear dotted when held to the light. They are found on the petioles of many plants, and between the teeth or notches of many others.

246. *Stings* are hair-like substances, causing pain by an acrid liquor, which is discharged upon their being compressed; they are hollow, slender, and pointed, as in the Nettle.

247. *Scales* are substances in some respects resembling the

243. What are thorns?

244. What does Fig. 39 represent?

245. What are glands?

246. What are stings?

247. What are scales?

coarse scales of a fish; they are often green, sometimes coloured, and are found upon all parts of vegetables, upon the roots of bulbous plants, and upon the stems and branches of other plants. They are *imbricated* upon the calyxes of most of the compound flowers. You have seen in buds, how important the scales are to protect the embryo plant during the winter. Scales surround the flowers of grasses, under the name of *glumes*. They envelope and sustain the stamens and fruit of the pine, oak, chestnut, &c.

Fig. 40.



248. *Tendrils*, or claspers, are threadlike, or filiform appendages, by which weak stems attach themselves to other bodies for support; they usually rise from the branches, in some cases from the leaf, and rarely from the leaf-stalk or flower-stalk. You have here the representation, Fig. 40, of a tendril. Tendrils are very important and characteristic appendages to many plants. In the Trumpet flower and Ivy, the tendrils serve for roots, planting themselves into the bark of trees, or in the walls of buildings. In the Cucumber and some other plants, tendrils serve both for sustenance and shade. Many of the papilionaceous, or Pea blossom plants, have twining tendrils, which wind to the right and back again. Some plants creep by their tendrils to a very great height, even to the tops of the loftiest trees; and seem to cease ascending only because they can find nothing higher to climb upon. One of our most beautiful climbing plants is the *CLEMATIS virginica*, or Virgin's bower, which has flowers of a brilliant whiteness; in autumn, its pericarps, with the long pistils remaining upon them, look like festoons of rich, yellowish fringe.

249. *Pubescence* includes all down, hairs, wooliness, or silkiness of plants. The pubescence of plants varies in different soils, and with different modes of cultivation. The species in some genera of plants are distinguished by the direction of the hairs. A microscope is sometimes necessary in determining with precision the existence and direction of the pubescence. It has been suggested that these appendages may be given to

248. What are tendrils?

249. What is included under the term pubescence?

plants for similar purposes as the fur, hair, and bristles of animals, viz.: to defend them from cold and other injuries.

Fig 41.



250. *The Bract* is a leaf among or near the flowers, different from the leaves of the plant. In this branch, (Fig. 41,) you observe the difference between the real leaves (*b b*) and the bract (*a*); the former being *cordate* and *entire*, the latter *lanceolate* and *crenate*.

251. In some plants, as in several species of the Sage, the transition from leaves to bracts is so gradual, as to render it difficult to distinguish between them, and a considerable part of the foliage is composed of bracts. In other plants, as the Crown imperial, the stem is terminated by a number of large and conspicuous bracts. The appendages are sometimes mistaken for the calyx.

252. We have now, in regular order, considered the first of the two classes of vegetable organs, viz.: such as tend to the support and growth of the plant, including *root, stem, leaf, and appendages*; we are next to enter

upon the description of a class of organs whose chief use appears to be that of bringing forward the fruit

CHAPTER XI.

Different parts of the Flower.—The Calyx.

253. You are no doubt pleased to have arrived at the blossom, that part of the plant which is the ornament of the vegetable kingdom. Flowers are delightful to every lover of na-

250. What is the bract?

251. Is it always easy to distinguish bracts from leaves?

252. What organs of the plant have we now considered?

253. What part of the plant is the ornament of the vegetable kingdom?

nure; a bouquet, or even the simplest blossom, presented by a friend, interests the heart. How many pleasant thoughts are awakened by the fresh and perfumed incense which is offered by flowers! their odour has been poetically termed the language by which they hold communion with our minds.

254. Although every part of a plant offers an interesting subject for study, the beauty of the blossom seems by association to heighten the pleasure of scientific research. Flowers are indeed lovely, but like youthful beauty, they are fading and transient; they are, however, destined for a higher object than a short-lived admiration; for to them is assigned the important office of producing and nourishing the fruit. May those also who study this book, so improve the bloom of life, that when youth and beauty shall have faded away, their minds may exhibit that fruit, which it is the important business of the season of youth to nurture and mature.

255. The parts of the flower, or the organs of fructification are the following:

Calyx,
Corolla,
Stamen,
Pistil,

Pericarp,
Seed,
Receptacle,

Calyx.

256. The Calyx is frequently wanting, as in the Tulip. The Corolla is also wanting in many plants, as in most of the forest trees, which to a careless observer, may seem to produce no flower, but the presence of a stamen and pistil, is in botany considered as constituting a *perfect flower*. These two organs are essential to the perfection of the fruit.

257. When a flower is destitute, either of stamens or pistils, it is termed *imperfect*. A flower is said to be *incomplete* when any of the seven organs of fructification are wanting.

258. The word Calyx is derived from the Greek, and literally signifies a cup; it is the cover of the corolla, and usually green; when not green, it is said to be *coloured*.

254. Is there any other office assigned to flowers than those of pleasing the senses?

255. Repeat the names of the parts of the flower.

256. What parts of the flower may be wanting,—and what parts are essential?

257. What is the difference between an imperfect and an incomplete flower?

258. What does the word calyx signify,—and what is the usual colour of the calyx?

259. The leaves or parts of the calyx are called *sepals*: sometimes the calyx consists of one leaf or sepal, it is then called *monosepalous*; when it consists of several distinct leaves, it is called *polysepalous*; when one calyx is surrounded by another, it is *double*; when one calyx surrounds many plants, it is *common*.

260. The calyx is said to be *superior* when it is situated on the summit of the germ, as in the apple; it is *inferior* when situated below the germ, as in the pink. In many plants the calyx is neither superior nor inferior, but is situated around the germ.

261. When the calyx drops off before the flower fully expands, it is called *caducous*; the petals of the poppy are, at first, enclosed in a calyx of two large green sepals, but these fall off before the flower is full blown. When the calyx withers and drops off with the corolla, it is called *deciduous*. In many plants it remains until the fruit is matured; it is then called *persistent*. In a pea pod, for example, the calyx may be seen as perfect as it was in the blossom. In an apple or pear the dried leaves of the calyx may be seen on the tops of the fruit; this shows that the calyx was superior.

262. According to the divisions of Linnæus, there are seven kinds of calyces; viz.:

Perianth,
Involucrum,
Ament,
Spatha,

Glume,
Calyptra,
Volva.

263. *Perianth*. This term is derived from the two Greek words *peri*, around, and *anthos*, flower. This is the only real calyx or cup, as the term cup does not properly apply to the other kinds of calyces. A good example of the perianth calyx is presented in the Rose, where it is *urn*-form, with divisions at the top resembling small leaves. In the Pink, the perianth is long and tubular, having the border dentate or toothed. The Hollyhock, Hibiscus, and many other plants, have a double perianth.

259. What is a monosepalous calyx?—polysepalous?—double?—common?

260. What terms express the various positions of the calyx with respect to the germ?

261. What terms express the different degrees of duration of the calyx?

262. What are the different kinds of calyces?

263. Describe the perianth.

264. *Involucrum*. This term is derived from the Latin, *involvo*, to wrap up; this kind of calyx is usually found at the base of an umbel, as in the Carrot. It is said to be *universal* when it belongs equally to the whole of an aggregate flower and *partial* when it encloses one floret, which, with others, constitutes a compound or aggregate flower. The term *involucrum* is also applied to the membranous covering in the fructification of ferns.

265. *Ament*, or *catkin*, is a kind of calyx, by some classed as a mode of inflorescence; it consists of many chaffy scales, ranged along a thread-like stalk or receptacle; each scale protects one or more of the stamens or pistils, the whole forming one aggregate flower. The *Ament* is common in forest trees; as in the Oak and Chestnut, and is also found in the Willow and Poplar. In some trees the staminate flowers are enclosed in an ament, and the pistillate in a perianth.

266. *Spatha* signifies a sheath. It is that kind of calyx which first encloses the flower, and when it expands, bursts lengthwise, and often appears at some distance below it. The Wild-turnip, or ARUM, furnishes an example of this kind of calyx, enclosing a kind of inflorescence called a *spadix*. From the peculiar appearance of the spadix, as it stands up surrounded by the spatha, it is sometimes called *Jack in the pulpit*. (See Fig. 41, a.) The spatha is common in many of our cultivated exotics, as in the Daffodil, where it appears brownish and withered after the full expansion of the flower.—You see here a representation, (Fig. 41, b), of the spatha of the Arum, and of the Narcissus (c).



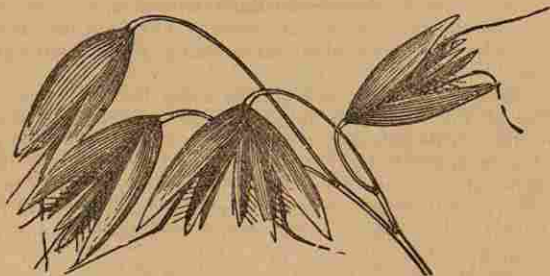
Fig. 41.

In the Egyptian Lily, the spatha is white and permanent, and the stamens and pistils grow separately upon the spadix. Palms have a spadix which is branched, and often bears a great quantity of fruit.

264. What is an involucrum?
265. What is an ament?
266. What is a

267. *Glume* is from the Latin word *gluma* a husk. This is the calyx of the grasses, and grass-like plants. In the Oat

Fig. 42.



a. d Wheat it forms the *chaff*. In the Oat, (Fig. 42,) the glume calyx is composed of two pieces or valves; in some kinds of grain, of but one, in others, of more than two valves. To the glume belongs the *awn* or beard. The corolla of grasses is husky, like the calyx, and is sometimes considered as a part of it.

268. *Calyptra*. This term is derived from the Greek, and signifies a veil. It is the cap, or hood, of pistillate mosses, resembling in form and position the extinguisher of a candle.

269. *Volva*, or curtain, the ring or wrapper of the Fungus, or Mushroom plants. It first encloses the head of the Fungus, afterwards bursts and contracts, remaining on the stems or at the root. (See Fig. 23.)

270. The calyx is of use in protecting the other parts of the flower, before they expand, and afterwards supporting them, by keeping all in their proper position. Pinks having petals with long and slender feet, which would drop or break without support, have a calyx. Tulips having firm petals, and each one resting upon a broad strong basis, are able to support themselves, and they have no calyx.

267. What is the glume?
268. What is the calyptra?
269. What is the volva?
270. Of what use is the calyx?

CHAPTER XII

Corolla.—Nectary.

271. THE term corolla, or corol, is derived from the Latin *corolla*, a little crown or chaplet. As the calyx is formed by a continuation of the fibres of the outer bark, the corolla is a continuation of the cellular integument, or inner coat of the same. The texture of the corolla is delicate, soft, watery, and coloured. The cuticle, or outward covering, of the corolla is of an extremely fine texture. The rich and variegated colours of flowers, arising from the delicate organization of the corolla; and to this cause, its transient duration may also be attributed.

272. The corolla exhibits every variety of colour, except black; florists sometimes present us with what they term black roses, and we see some other flowers which approach this colour, yet none are perfectly black; the darkest being but a very deep shade of purple. Corollas are white, yellow, blue, violet, &c.; in some, different colours are delicately shaded and blended; in others, they meet abruptly, without any intermediate tint.

273. The corolla, before blossoming, is folded in the calyx, as the leaves are within the scales of the leaf-bud, and the whole is then called the flower-bud.

274. In most cases, the calyx and corolla are so distinctly marked, that it is perfectly easy to distinguish them. The colour usually constitutes a very striking mark of difference; the calyx being ordinarily green, and the corolla of a more lively hue, but the colour is not always a criterion. In some cases, the calyx is beautifully coloured.

275. Each simple part, of which the corolla is composed, is called a *petal*. A flower with petals is said to be *petalous*, without petals, *apetalous*. The petals are *definite*, when their number is not more than twenty; *indefinite* when they exceed that number.

276. If the corolla is formed of one single piece, or petal, it is *monopetalous*, if of more than one, it is *polypetalous*. You

271. What is the corolla?

272. What is observed of the various colours of the corolla?

273. Where is the corolla before blossoming?

274. How are the calyx and corolla distinguished?

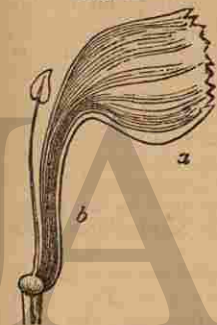
275. What is said of the divisions of the corolla, and the terms which express them?

276. What is meant by the terms monopetalous and polypetalous?

may sometimes find a difficulty in determining whether the corolla is in one piece or more; for monopetalous flowers often have deep divisions, extending almost to the base of the corolla; but a corolla must be divided at the base, or be in separate pieces, in order to be considered as *polypetalous*. It is a good rule to consider the parts into which a corolla naturally falls, as so many petals.

277. *Monopetalous corollas* (see Fig. 44,) consists of the *tube*, *throat*, and *limb*. The *tube*, is the lower part, having more or less the form of a tunnel. The *throat* is the entrance into the tube; it is either open, or closed by scales or hairs. The *limb* is the upper border of the corolla.

278. *Polypetalous corollas* consist of several petals. Each petal consists of two parts, the *lamina* and *claw*.



279. The *lamina*, (Fig. 43, *a*) is the upper and usually thinner part of the petal; its margin is sometimes *entire*, or without divisions, as in the Rose; sometimes notched, or *crenate*, as in the Pink. The lamina corresponds to the limb of monopetalous corollas.

280. The *claw* (Fig. 43, *b*), is the lower part of the petal, and inserted upon the receptacle; it is sometimes very short as in the Rose; in the Pink, as seen at Fig. 43, it is long and slender. The claw is analogous to the tube of monopetalous corollas.

281. The corolla is *superior* when it is inserted above the germ; *inferior*, when below. It is *regular* when each division corresponds to the other. The Rose and Pink have regular corollas. When the parts do not correspond with each other, a corolla is *irregular*, as in the Pea and Violet.

Different forms of Monopetalous Corollas.

Monopetalous corollas may, according to their forms, be divided as follows;

277. What are the parts of a monopetalous corolla?

278. What are the parts of a polypetalous corolla?

279. What is the lamina?

280. What is the claw?

281. What is meant by the terms inferior and superior, regular and irregular, when applied to the corolla?

Fig. 44.



282. *Bell-form*, here the tube is no very distinct, as the corolla gradually spreads from the base; as in the blue-bell, hare-bell, &c. At Fig. 44, is the representation of a bell-form corolla; it is monopetalous; the limb (a) is five parted; calyx (b) five parted; corolla superior, or above the germ.

Fig. 45.



283. *Funnel-form* having a tubular base, and a border opening in the form of a funnel, as the morning-glory. (Fig. 45.)

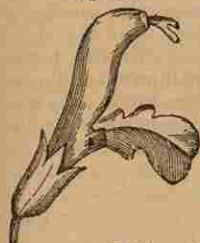
Fig. 46.



284. *Wheel-form* having a short border without any tube, or with a very short one (Fig. 46.)

282. Describe the bell-form corolla.
283. Describe the funnel-form corolla.
284. What is meant by wheel-form?

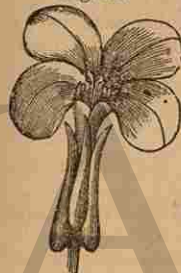
Fig. 47.



285. *Labiate*, (from *labia*, lips,) consists of two parts, resembling the lips of a horse, or other animal. Labiate corollas are said to be *personate*,* having the throat closed, or *ringent*,† with the throat open. You have here a labiate corolla of the *ringent* kind. (Fig. 47.)

Different forms of Polypetalous Corollas.

Fig. 48.



286. *Cruciform* (from *cruz*, a cross) consisting of four petals of equal size, spread-out in the form of a cross as the Radish, Cabbage, &c. (Fig. 48.)

Fig. 49.



287. *Caryophyllous*, having five single petals, each terminating in a long claw, enclosed in a tubular calyx, as the Pink, (Fig. 49.)

- * From *persona*, a mask.
† From *ringor*, to grin or gape.

285. What is a labiate corolla, and what is meant by the terms *personate* and *ringent*?

286. Describe the cruciform corolla.

287. Describe the caryophyllous corolla.

288. *Liliaceous*, a corolla with six petals, spreading gradually from the base, so as to exhibit a bell-form appearance, as in the Tulip and Lily.

289. *Rosaceous*, a corolla formed of roundish spreading petals, without claws, or with very short ones, as the Rose and Apple.

Fig. 50.



290. *Papilionaceous*, a flower with a banner, two wings, and a keel; the name is derived from the word *papilio*, a butterfly, on account of a supposed resemblance to this insect, as in the Pea blossom, (Fig. 50.)

291. When a corolla is of no determinate form, it is said to be *anomalous*.

Odour of Flowers.

292. The odour of flowers has its origin in the volatile oils, elaborated by the corolla.

293. Temperature renders the odours of flowers more or less sensible; if the heat is powerful, it dissipates the volatile oils more rapidly than they are renewed; if the heat is very feeble, the volatile oils remain concentrated in the little cells where they were elaborated; in both cases the flowers appear to have but little odour. But if the heat is neither too great nor too little the volatile oils exhale without being dissipated, forming a perfumed atmosphere around the flowers.

294. You see now the reason, that when you walk in a garden in the morning, or towards evening, the flowers seem more fragrant than in the middle of the day. The air being also more damp causes an increase of fragrance at those times, as the moisture, by penetrating the delicate tissue of the corollas, expels the volatile oils.

288. What is a liliaceous corolla?
 289. What is a rosaceous corolla?
 290. What is a papilionaceous corolla?
 291. When is a corolla said to be anomalous?
 292. What causes the odour of flowers?
 293. What effect has temperature upon the odour of flowers?
 294. Why do flowers appear peculiarly fragrant in the morning and evening?

Uses of the Corolla.

295. One important office of the corolla is to secure the stamens and pistils from all external injury, and to favour their development. After the germ has become fertilized by the influence of the pollen, the corolla fades away, and either falls off, or remains withered upon the stalk; the juices which nourished it then go to the germ, to assist in its growth, and enable it to become a perfect fruit. Another use of the corolla seems to be to furnish a resting-place for insects in search of honey.

296. The corolla is supposed by Darwin, an English botanist, to answer the same purpose to the stamens and pistils, as the lungs in the animal system; each petal being furnished with an artery which conveys the vegetable blood to its extremities, exposing it to the light and air. This vegetable blood, according to this theory, is then collected and returned in correspondent veins, for the sustenance of the anthers and stigmas, and for the purpose of secreting honey.

297. After all our inquiries into the uses of the corolla, we are obliged to acknowledge that it appears not as important in the economy of vegetation, as many less showy organs. It seems chiefly designed to beautify and enliven creation by the variety and elegance of its forms, the brilliancy of its colouring, and the sweetness of its perfume.

Nectary.

298. In many flowers there is an organ called the *nectary*, which secretes a peculiar fluid, the honey of the plant; this fluid constitutes the principal food of bees, and various other species of insects.

299. The nectary seems not to be confined to any particular part of the flower. Sometimes it is a mere *cavity*, as in the lily

295. What are some of the uses of the corolla?
 296. What was Darwin's opinion of the use of the corolla?
 297. For what does the corolla seem chiefly designed?
 298. What is the use of the nectary?
 299. Is the nectary confined to any particular part of the flower?

Fig. 51.



300. The Crown imperial, *Fritillaria Imperialis*, exhibits in the claw of each of its petals, a cavity called a nectary, each one is always filled with a sweet liquid. If these drops are removed, others immediately take their place. You have here a representation (Fig. 51.) of this flower; its petals appear as if cut off, in order to show the six nectariferous glands at the base of each.

201. In the *Ranunculus*, the nectary is a production of the corolla, in the form of a *scale*; in the violet a process of the same, in the form of a *horn* or *spur*. In the Columbine, the nectary is a separate organ from the petals in the form of a *korn*. In the Monks-hood, one of the petals, being concave, conceals the nectaries; they are therefore said to be *hooded*.

CHAPTER XIII.

Stamens and Pistils.

302. The stamens and pistils in most plants are enclosed by the same envelope, or stand upon the same receptacle; in the class *Monœcia* they are on different flowers which spring from one common root; and in *Diœcia*, they are on different flowers springing from different roots. Yet, however distant the stamens and pistils may be, nature has provided ways by which the pollen from the staminate flowers is conveyed to the pistilate, to assist in perfecting the seed. That you may be better understand this curious process, and the organs by means of which it is carried on, we will examine each one separately.

Stamens.

303. Stamens are thread-like parts, exterior as to the pistil, and interior as to the corolla. They exhibit a variety of positions, some being inserted upon the pistil, some below it, and others around it.

300. What is said of the nectaries of the Crown imperial?
 301. What are some of the other forms in which nectaries appear?
 302. Are the stamens and pistils always upon the same flowers?
 303. How are stamens situated with respect to the pistil and corolla?

304. When a corolla is monopetalous, the number of stamens is usually either equal or double, or half that of the divisions of the corolla; the stamens in such flowers never exceed twenty.

305. In polypetalous corollas, the number of stamens may be much greater. When the number of stamens equals the divisions of the corolla, they usually alternate with these divisions of the corolla, half of the stamens are usually placed in the intervals of the divisions, and the remaining half before each lobe of the corolla, corresponding to the intervals in the divisions of the calyx. If any of the stamens are barren or without anthers, they are those which are placed before the lobes of the corolla.

306. In commencing the analysis of flowers according to the Linnæan system, you learned that the *number* of stamens, their *position*, *relative length*, and *connexion*, taken either singly or in combination, afford certain and distinctive marks for purposes of classification.

307. In the first place we find the stamens differing in *number*, in different plants; some plants have but one, some two, and so till we come to ten; when they have more than ten stamens, we find the number in the same plant varies, and therefore we cannot depend on the circumstance of number for further classification.

308. Secondly, we regard the *position*, and consider whether the stamens are inserted upon the calyx or the receptacle, thus furnishing an eleventh and a twelfth class.

309. Thirdly, *inequality in the length of stamens*, considered with respect to number, furnishes us with a thirteenth and fourteenth class.

310. Fourthly, the *connexion or union of stamens* gives us the fifteenth class, where the filaments of the stamens are united in one set; the sixteenth class where they are in two sets; the seventeenth where the anthers of the stamens are united.

311. Fifthly, the three remaining classes of phenogamous plants are distinguished by the *position of the stamens with respect to the pistils*. In the eighteenth class the stamens

304. What is said of the stamen of monopetalous corollas?
 305. What is said of the stamens of polypetalous corollas?
 306. What did you learn respecting stamens, in commencing the analysis of flowers?
 307. What is the first thing in which we find stamens to differ?
 308. What do we regard secondly with respect to the stamens?
 309. What do we observe thirdly with respect to the stamens?
 310. What do you observe fourthly as to the stamens?
 311. What do we observe fifthly with respect to the stamens?

stand on the pistil; in the nineteenth, the stamens and pistil are on separate flowers on the same plant; in the twentieth they are on separate plants. Lastly, in Cryptogamous plants, they are invisible.

312. We will now proceed to the parts of the stamen; these are two. The *filament* and *anther*. The *filament*, is so called from *filum*, a thread. Filaments vary in their form; some are long and slender, as in the pink; others are short and thick, as in the tulip. They are usually smooth, but in the Mullein they are bearded, in the Spider-wort they are covered with down. In most cases a filament supports but one anther, but sometimes it is forked and bears two or more; in some instances, many filaments have but one anther. When the filaments are enclosed in the tube of the corolla, they are said to be *inserted*, when they extend out of it, *exserted*. In some cases the filament is wanting, and the anther is *sessile*, or immediately attached to the corolla.

313. In double flowers, the stamens, which seem to be intimately connected with the parts of the corolla, are changed to petals. This is the effect of cultivation, which by affording the stamens excess of nourishment, causes them to swell out, and thus assume the form of petals. In some double flowers almost every trace of the stamens disappears; in others, it is very easy to perceive the change which they have undergone, as they retain something of their original form. The anthers usually disappear, which shows that the filaments have absorbed all the nourishment. In many double flowers, roses especially, we can see the change as it takes place, some stamens being entirely changed, others retaining something of their form, and others still perfect. When all the stamens disappear, no perfect fruit is produced.

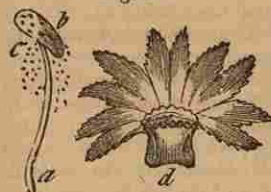
314. On account of this change in the stamens, cultivated flowers are not usually so good for botanical analysis, as wild ones. The single flower exhibits the number of parts which nature has given to it. The Rose in its native state has but five petals.

312. What is said of the filament?

313. What causes double flowers?

314. Are cultivated flowers usually the best for analysis?

Fig. 52



315. The *Anther*, is a little knob or box, usually situated on the summit of the filament; it has cells or cavities which contain a powder called the *pollen*; this is yellow, and very conspicuous in the Lily and Tulip. You have here the representation (Fig. 52) of a stamen with its filament (*a*), its anther (*b*) and the discharging pollen (*c*). In many flowers, you will perceive the filament to be wanting; the anthers are then said to be *sessile*; that is, placed immediately upon the corolla; as at *d*, which represents a flower cut open, and its five stamens growing sessile in the throat.

Pistils.

315. In the centre of the flower stands the Pistil, an organ essential to the plant. Like the stamens, pistils vary in number in different plants, some having but one, others hundreds. Linnæus has founded the orders of his first twelve classes on the number of these organs.

317. The pistil consists of three parts, *germ*, *style*, and *stigma*. It may be compared to a pillar; the germ (Fig. 53, *a*) corresponding to the base; the style (*b*) to the shaft; and the stigma (*c*) to the capital.

Fig. 53.



The figure at (*g*) represents the pistil of the Poppy; the germ or base is very large; you will perceive that the style is wanting, and the stigma is *sessile*, or placed immediately on the germ. The style is not an essential part, but the stigma and germ are never wanting; so that these two parts, as in the Poppy, often constitute a pistil.

318. *Germ*. The germ contains the rudiments of the fruit yet in an embryo or unformed state. This germ is the future fruit, but in passing to its perfect state it undergoes a great

315 Describe the anther.

316 Describe the pistil.

317 What are the parts of the pistil?

318 Describe the germ.

change. You would scarcely believe that the Pumpkin is but the germ of the small yellow flower of the plant.

319. *Style*. This, like the filament, is sometimes wanting; when present, it proceeds from the germ, and bears the stigma on its summit. It is usually long and slender, of a cylindrical form, consisting of bundles of fibres, which transmit the fertilizing pollen from the stigma to the germ.

320. *Stigma*. This word signifies perfecting. The stigma is the top of the pistil, and always present; if the style be wanting, it is placed upon the germ, and said to be *sessile*, as in the Tulip and Poppy. The stigma is various in size and form; sometimes it is a round head; sometimes hollow and gaping, more especially when the flower is in its highest perfection; it is generally downy, and always more or less moist with a peculiar, glutinous fluid.

Use of the Stamens and Pistils.

321. We will now consider the use of the stamens and pistils, those organs so important, that without them no plant would produce fruit.

322. The pollen of the stamens, when the flower becomes mature, being thrown from the anther by the opening of its lids, falls upon the stigma, or top of the pistil, and passes through the style to the germ. In the germ are little seeds beginning to form, but which would never come to maturity without the agency of the pollen. You see now the wonderful contrivance by which the races of plants are preserved.

323. The real use of stamens and pistils was long a subject of dispute among philosophers, till Linnæus explained it beyond a possibility of doubt. These organs have, from the most remote antiquity, been considered of great importance in perfecting the fruit. The Date Palm, which was cultivated by the ancients, bears stamens and pistils on separate trees; the Greeks discovered that in order to have good fruit, it was necessary to plant the two kinds of trees near each other, and that without this assistance the dates had no kernel, and were not good for food.

324. Although the fertilization of plants, where the stamens

319. Describe the style.

320. What is the stigma?

321. What is said of the importance of the stamens and pistils?

322. Give an account of the manner in which the seeds in the germ are fertilized.

323. What did the Greeks discover with respect to the date-palm?

324. What are some of the various modes in which nature conveys pollen to the pistillate plants?

and pistils are on separate flowers, depends a little upon chance, the favourable chances are so numerous that it is hardly possible, in the order of nature, that a pistillate plant should remain unfertilized. The particles of the pollen are light and abundant, and butterflies, honey bees, and other insects, transport them from flower to flower. The winds also assist in executing the designs of nature.

325. The pollen of Pines and Firs, moved by winds, may be seen rising like a cloud above the forests; the particles being disseminated, fall upon the pistillate flowers, and rolling within their scaly envelopes, fertilize the germs.

326. A curious fact is stated by an Italian writer, viz., that at places about forty miles distant, grew two Palm trees, the one without stamens, the other without pistils; neither of them bore seeds for many years; but in process of time they grew so tall as to tower above all the objects near them. The wind thus meeting with no obstruction, wafted the pollen from the staminate to the pistillate flowers, which to the astonishment of all, began to produce fruit.

327. "Gardeners," says a botanical writer, "formerly attempted to assist nature, by stripping off the infertile flowers of melons and cucumbers, considering them as unnecessary incumbrances, since they would never become fruit. But finding that they then obtained no fruit at all, they soon learned the wiser practice of admitting the winds to blow, and the insects to transfer, the pollen of the infertile to the fruit-bearing flowers."

CHAPTER XIV.

Inflorescence—Receptacle—Fruit—Linnæus' classification of Pericarps.

328. We shall now proceed to consider the various ways in which flowers grow upon their stalks; this is called their *inflorescence*, or mode of flowering.

325. What is said of the pollen of pines and firs?

326. What fact is stated by an Italian writer?

327. What is the effect of stripping off the infertile or staminate flowers of plants?

328. What is meant by inflorescence?

Inflorescence.

329. The most common kinds of inflorescence are the *whorl*, *raceme*, *panicle*, *spike*, *umbel*, *cyme*, *corymb*, *fascicle*, *scab*, *ament*, and *spadix*.

Fig. 54.



330. A *whorl* (Fig. 54,) is an assemblage of flowers surrounding the stem or its branches. This is seen in Mint, and many of the labiate plants. Flowers which grow in this manner are said to be *verticillate*, from the Latin word *verto*, to turn. Leaves surrounding the stem in a similar manner are said to be *stellate*, or like a star.

329. Which are the most common kinds of inflorescence?
330. Describe the whorl.

Fig. 55.



331. A *raceme*, (Fig. 55,) *a*, consists of numerous flowers on its own stalk or *pedicel*, and all arranged on one common *peduncle*, as a bunch of currants.

332. A *panicle*, (Fig. 55,) *b*, bears the flowers in a kind of loose subdivided bunch or cluster, without any regular order, as in the oat. A *panicle* contracted into a compact, somewhat ovate form, as in the Lilac, is called a *thyrs*e or bunch; a bunch of grapes is a good example of a *thyrs*e.

331. Describe the raceme.
332. What is a panicle, and how does a *thyrs*e differ from it?

Fig. 56.



flowers or their summits; as Fennel and Carrot.

335. A cyme (Fig. 56, c) resembles an umbel in having its common stalks all spring from one centre, but differs in having those stalks irregularly sub-divided; as the Snow-ball and Elder.

333. What is a spike?

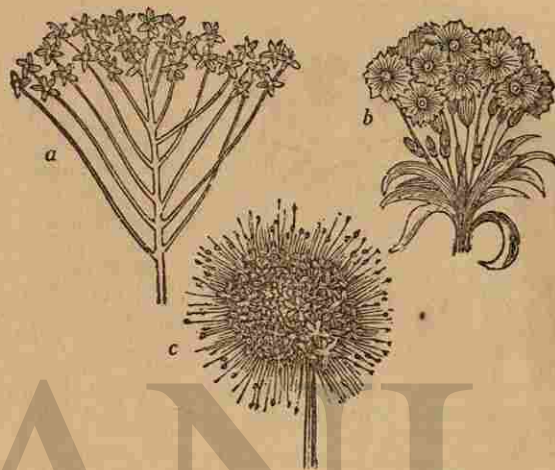
334. What is an umbel?

335. What is a cyme?

333. A spike, (Fig. 56, a) is an assemblage of flowers arising from the sides of a common stem; the flowers are sessile, or with very short peduncles, as the Grasses and the Mullein. A spike is generally erect. The lowest flowers usually blossom and fade before the upper ones expand. When the flowers in a spike are crowded very close, an *ear* is formed, as in *Indian corn*.

334. An umbel (Fig. 56, b) presents several flower-stalks of nearly equal length, spreading out from a common centre, like the rays of an umbrella, bearing

Fig. 57.



336. 7th. *Corymb* (Fig. 57, a) or false umbel, when the peduncles rise from different heights above the main stem, but the lower ones being longer, they form nearly a level or a convex top; as the Yarrow.

8th. *Fascicle* (Fig. 57, b) flowers on little stalks variously inserted and subdivided, collected into a close bundle, level at the top; as the Sweet-William; it resembles a corymb, but the flowers are more densely clustered.

437. 9th. *Head* (Fig. 57, c) or tuft, has sessile flowers heaped together in a globular form; as in the Clover, and Button Bush.

336. What is a corymb, and what is a fascicle?

337. What is a head?

Fig. 58.



egg-shaped, pointed germ; the germ is superior, and bears four (sometimes eight) stigmas.

340. The staminate ament of the Poplar resembles the pistillate, except that its corolla encloses eight stamens but no pistil. The Poplar is in the class *Dioecia*, (or *two houses*), because the pistillate and staminate flowers are on different trees, and of the order *Octandria*, because its barren flowers have eight stamens.

338. What is an ament?

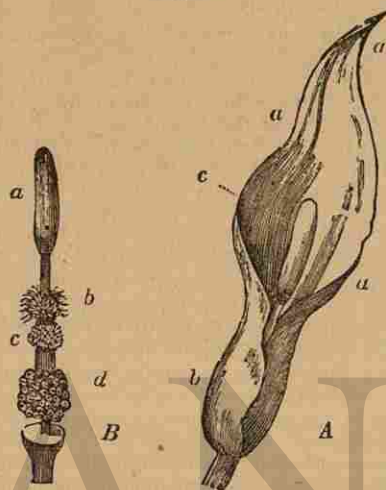
339. What does Fig. 58 represent?

340. Why is the Poplar in the class *Dioecia*, order *Octandria*?

338. 10th. *Ament*, or catkin, is an assemblage of flowers, composed of scales and stamens, arranged along a common, thread-like receptacle, as in the Chestnut and Willow; this is more particularly described under the divisions of the calyx. The scales of the ament are properly the calyxes; the whole aggregate, including scales, stamens or pistils, and filiform *receptacle*, constitutes the ament.

339. At Fig. 58, is the representation of the ament of the Poplar, containing pistillate flowers; this is oblong, loosely imbricated, and cylindrical; the calyx is a flat scale, with deep fringed partings. At *b*, is an enlarged representation of the fertile or pistillate flower: the calyx or bract is a little below the corolla, which is cup-shaped, of one petal, and crowned with an

Fig. 59.



343. At *B* (Fig. 59) is the spadix divested of the spathe, *a* is the claviform summit, *b* a ring of filaments without anthers, *c* a ring of sessile anthers, *d* a dense ring of pistillate flowers with sessile stigmas; each germ produces a one celled globular berry.

344. This is a plant of the class *Monœcia*, (*one house*), because its staminate and pistillate flowers are separate, but yet grow on the same plant; it is in the order *Polyandria*, because its stamens are numerous.

Receptacle.

345. The receptacle is the extremity of the peduncle; at first it supports the flower, and afterwards the fruit. As this is its only use, it may properly be considered in connexion with

341. Describe the spadix.

342. What does Fig. 59 represent?

343. What is represented at *B*, Fig. 59?

344. Why is the Wild Turnip in the class *Monœcia*, order *Polyandria*?

345. What is the receptacle?

341. 11th. *Spadix*, is an assemblage of flowers growing upon a common receptacle, and surrounded by a spathe or sheath, as in the Egyptian lily.

342. At Fig. 59, *a*, is a representation of the blossom of the Wild turnip, (*arum*); *a*, represents the spathe, which is erect, sheathing, oblong, convolute at the base, *b*, this is compressed above and below the middle; *c* represents the spadix, which from its club-shaped appearance, is called *claviform* (from *clava*, a club).

he organs of fructification. In simple flowers, as the Tulip, the receptacle is scarcely to be distinguished from the peduncle, but in compound flowers it is expanded, and furnishes a support for the flowers and fruit. Receptacles are of various kinds; as,

346. 1st. *Proper*, supports but one flower, as in the Violet and Lily. 2d. *Common*, supports many flowers or florets, the assemblage of which forms an aggregate or compound flower, as in the Sunflower and Dandelion. The common receptacle presents a great variety of forms, it is either *dry* or *pulpy*; *concave* in the Artichoke; *convex* in other plants; *flat*, in the Sunflower; *conical* in some, and *spherical* in other plants. As to its surface, it is *punctuate*, or interspersed with hollow points or dots, as in the Daisy, *hairy* as in the Thistle, *naked* as in the Dandelion, or *chaffy* as in the Camomile. 3d. *Rachis*, is the filiform receptacle which connects the florets in a spike, as in the heads of wheat. 4th. *Columella*, or pillar, is the central column of the fruit, as the cob of the Indian corn.

The Fruit.

347. The fruit is composed of two principal parts, the *pericarp* and *seed*. The term pericarp is derived from *peri* around, and *karpos* seed or fruit; it signifies surrounding the seed. All that part in any fruit which is not the seed belongs to the pericarp.

Pericarp and Seed.

348. The germ being fertilized, the parts of the flower which are not necessary for the growth of the fruit, usually fade and either fall off, or wither away. The germ continues to enlarge until it arrives at perfection. Every kind of fruit,* you can see, has been once but the germ of a flower. The size of fruit is not usually proportioned to that of the vegetable which produced it. The Pumpkin and the Gourd grow upon slender herbaceous plants, while the large Oak produces but an acorn.

349. The pericarp consists of *valves*, *sutures*, *partitions*, *cells*, and a *receptacle*.

* The term fruit, in common language, is limited to pulpy fruits which are proper for food; but in a botanical sense, the fruit includes the seeds and pericarps of all vegetables.

346. Mention the different kinds of receptacle.

347. Of what is the fruit composed?

348. What takes place in the flower after the germ is fertilized?

349. Of what does the pericarp consist?

350. 1st. *Valves*, are the *pieces*, which form the sides of the seed vessels. If a pericarp is formed of one piece, it is *univalved*; the chestnut is of this kind. A pericarp with two valves is said to be *bivalved*, as a pea pod. The pericarp of the Violet is *trivalved*, that of the Stramonium *quadrivalved*. Most valves separate easily when the fruit is ripe; this separation is known by the term *dehiscence*.

2d. *Sutures* or *seams*, are lines which show the union of valves; at their seams the valves separate in the mature stage of the plant.

3d. *Partitions* or *dissepiments*, are internal membranes which divide the pericarp into different cells; these are *longitudinal* when they extend from the base to the summit of the pericarp; they are *transverse* when they extend from one side to the other.

351. *Column* or *columella*, the axis of the fruit; this is the central point of union of the partitions of the seed vessels; it may be seen distinctly in the core of an apple. This was noticed under the head of receptacles; it is the receptacle of the fruit.

352. 4th. *Cells*, are divisions made by the dissepiments and contain the seeds; their number is seldom variable in the same genus of plants, and therefore serves as an important generic distinction.

353. 5th. *Receptacle*, is that part of the pericarp to which the seed remains attached until its perfect maturity; this organ, by means of connecting fibres, conveys to the seed for its nourishment, juices elaborated by the pericarp.

354. Some plants are destitute of a pericarp, as in the labiate flowers, the compound flowers, and the grasses; in these cases the seeds lie in the bottom of the calyx, which performs the office of a pericarp.

Linnaeus' Classification of Pericarps.

355. Linnæus divided pericarps into the nine following classes; *Capsule*, *Silique*, *Legume*, *Follicle*, *Drupe*, *Nut*, *Pome*, *Berry*, and *Strobilum*.

356. **CAPSULE**, signifies a little chest or casket; that is c

350. Describe each of these parts.

351. What is the column?

352. What are cells?

353. What is the receptacle?

354. Are any plants destitute of a pericarp?

355. What is Linnæus' division of pericarps?

356. What is a capsule?

hollow pericarp; which spontaneously opens by pores, as the poppy, or by valves, as in the Mullein.

Fig. 60.



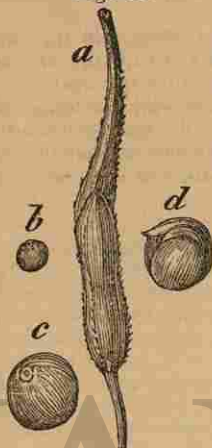
357. Fig. 60, *a*, represents the capsule of one species of Lily, the *Martagon*, as it appears after the opening of the valves or pieces which compose the pericarp. At *b* is the same capsule represented as cut crosswise, shewing the seeds as they lie in their different cells

358. 2d. **SILIQUE**, or *Siliqua*, is a two-valved pericarp or pod, with the seeds attached alternately to its opposite edge, as Mustard and Radish. The proper silique is two-celled, being furnished with a membrane, which runs the whole length of this kind of pericarp, forming a partition; upon this the seeds are arranged. See Fig. 69 *D. b.*

357. What does Fig. 60 represent?

358. Describe the silique.

Fig. 61.



359. Fig. 61, *a*, represents a silique, the fruit of the white mustard; this is *rostrate*, terminating like a bird's beak; *b*, represents a globular seed; *c*, the same magnified; *d*, shews the seed dividing and the embryo making its appearance.

360. **Silicle** (*silicula*, a little pod,) is distinguished by being shorter than the proper silique; it is almost round, as in the Shepherd's purse. This difference, in the form of the Silique and Silicle, is the foundation of the distinction of the orders in the class Tetradyamia.

361. 3d. **LEGUME**, is a pericarp of two valves, with the seeds attached only to one *suture* or seam; as the pea.

362. In this circumstance it differs from the Silique, which has its seeds affixed to both Sutures. The word *pod* is used in common language for both these species of pericarp.

363. Plants which produce legumes, are called *leguminous*. The greater number of these plants are in the 16th class, *Dialdelphia*.

Fig. 62.



359. What does Fig. 61 represent?

360. What is a silicle?

361. What is a legume?

362. How does it differ from the silique?

363. In what class are most leguminous plants?

364. Fig. 62, *a*, represents a *legume*. *b*, the same cut transversely in order to show the two cells.

365. 4th. FOLLICLE, is a one-valved pericarp, which opens longitudinally on one side, having its seed loose within it, that is not bound to the suture.

Fig. 63.



366. Fig. 63, shows a fruit of this kind, which is composed of three pods or follicles; *a* shows the valve opening; *b*, a seed cut lengthwise. This is a compound fruit, of the Monk's-hood, (*Aconitum*.)

367. 5th. DRUPE, a stone fruit, is a kind of pericarp which has no valve, and contains a nut or stone, within which there is a kernel. The Drupe is mostly a moist, juicy fruit; as in the plum, cherry, and the peach. The nut or stone in the drupe, is a kind of woody cup commonly containing a single kernel called the *Nucleus*: this hard shell thus enve-

loping the kernel, is called the *Putamen*; it may be seen in the stone of a cherry or peach.

368. 6th. NUT, is a seed covered with a shell, resembling the capsule in some respects, and the drupe in others; this you may see in the walnut, chestnut, &c.

369. 7th. POME, is a pulpy pericarp without valves, but having a membranous capsule, with a number of cells, which contain the seeds. This species of pericarp has no external opening or valve. The apple, pear, quince, gourd, cucumber, and melon, furnish us with examples of this kind of pericarp. With respect to form, the *Pome* is oblong, ovate, globular, &c. the form of fruits being much varied by climate and soil. You know that apples are not uniform in their size or figure. With respect to the number of cells also, the apple is variable.

370. 8th. BERRY, is a succulent, pulpy pericarp, without valves, and containing naked seeds, or seeds with no other covering than the pulp which surrounds it, as in the gooseberry and currant; the seeds in the berry are sometimes dispersed.

364. What does Fig. 62 represent?
 365. What is a follicle?
 366. What is represented by Fig. 63?
 367. Describe the drupe.
 368. What is a nut?
 369. What is a pome?
 370. Describe the berry

promiscuously through the pulpy substance, but are more generally placed upon receptacles within the pulp. A compound berry consists of several single berries, each containing a seed, united together; as in the blackberry and raspberry. Each of the separate parts is called an *acinus*, or grain. The orange and lemon are berries with a thick coat.

371. There are some kinds of berries, usually so called, that seem scarcely entitled to the name; in these the pulp is not properly a part of the fruit, but originates from some other organ; thus in the mulberry and strawberry the calyx becomes coloured and very juicy, surrounded by seeds like a real berry. Some botanists in describing the strawberry, say that what is commonly called the berry, is but a pulpy receptacle, studded with naked seeds. In the fig, the whole fruit is a juicy calyx, or common receptacle, containing in its cavity innumerable florets, each of which has a proper calyx of its own, which becomes pulpy, and invests the seed, as in the mulberry.

372. 9th. STROBILUM, a cone; is a Catkin or Ament hardened and enlarged into a seed vessel, as in the pine; this is called an aggregate, or compound pericarp. In the most perfect examples of this kind of fruit the seeds are closely enveloped by the scales as by a capsule. The Strobilum is oblong in the pine, round in the cypress, very small in the alder and birch.

When you eat fruit, as almonds, walnuts, apples, peaches, currants, &c., you will no doubt be pleased to be able to give them their proper place in the classes you have just been considering.

CHAPTER XV.

The Seed.

We have now traced the plant from the root through all its various organs, until we have arrived at that part, which is a link in the chain of vegetable existence between the old and new plant; if this were destroyed, if the seeds of plants were no longer perfected, what changes would the whole face of nature present!

373. The earth would in one year be stripped of the whole

371. What is said of the blackberry, strawberry, mulberry, and fig?
 372. Describe the strobilum.
 373. What appearances would nature present if seeds were no longer perfected?

tribe of *annual* plants; in another the *biennial* plants would vanish; the *perennial* would, year after year, disappear, until (if we could suppose our own lives to be prolonged to the usual age of man,) we should behold the earth one vast scene of vegetable ruin; occasionally here and there a venerable oak or an ancient pine would stand in solitary grandeur, the mournful remnants of the once beautiful and fertile vegetable kingdom.

374. But such a sad spectacle the earth will never present, for we have the promise of God himself, that "while the earth remaineth, seed time and harvest shall not cease."

375. We have seen in the progress of our inquiries, that while the present plant is diffusing around it beauty and fragrance and administering to the necessities and luxuries of man, the watchful care of that Being, who never slumbers nor sleeps, is by a slow but certain progress perfecting that part which is destined to continue the various species of plants until time shall be no more.

376. The *seed* is that internal part of the fruit which contains the complete rudiment of a new plant, similar to that from which it received its existence.

377. The seed consists of three principal parts, viz. the *eye*, *husk*, and *kernel*.

378. 1st. The *Eye*, or *hilum*, is the scar formed by the separation of the membrane or thread which connected the seed with the pericarp, and conveyed to the former the necessary nourishment. You can see the eye plainly in a bean or kernel of corn.

379. 2d. The *Husk*, is the outer coat of the seed, which, on boiling, becomes separate; as in peas, beans, Indian corn, &c. The husk surrounds the kernel; it is essential, as the kernel, which is originally a fluid, could not be formed without its presence.

380. 3d. The *Kernel*, includes all that is contained within the husk; it is also called the *nucleus* or almond of the seed. The kernel is usually composed of the *albumen*, *cotyledon*, and *embryo*.

381. Albumen makes up the chief part of some seeds, as the

374. Will the earth ever present such a spectacle?
 375. What have we seen in the progress of our inquiries?
 376. What does the seed contain?
 377. Of how many parts does the seed consist?
 378. Describe the eye.
 379. What is the husk?
 380. What is the kernel, and into how many parts is it divided?
 381. What is said of the albumen?

grasses, corn, &c.; in the nutmeg, which has very small cotyledons, it is remarkable for its variegated appearance and aromatic quality. It chiefly abounds in plants which have but one cotyledon.

Fig. 64.



382. Fig. 64 represents the garden bean. *a* shows the cotyledons; *b* and *c*, the embryo; *d* shows the petioles or stems of the cotyledons.

383. *Cotyledons* (from a Greek word, *kotule*, a cavity,) are the thick fleshy lobes of seeds, which encircle the embryo. In beans they grow out of the ground in the form of two large leaves. Cotyledons are the first visible leaves in all seeds, almost always fleshy and spongy, of a succulent and nourishing substance, which serves for the food of the embryo at the moment of its germinating. Nature seems to have provided the cotyledons to nourish the plant in its tender infancy. After seeing their young charge sufficiently vigorous to sustain life without their assistance, they, in most plants, wither and die. The number of cotyledons varies in different plants; there are some plants which have none.

384. *Acotyledons*, are those plants which have no cotyledons in their seeds; such as the *cryptogamous* plants, *mosses*, &c.

385. *Mono-cotyledons*, such as have but one cotyledon, or lobe, in the seed; as the *grasses*, *liliaceous* plants, &c.

386. *Di-cotyledons*, such plants, as have two cotyledons; they include the greatest proportion of vegetables: as the *leguminous*, the *syngenesious*, &c.

387. *Poly-cotyledons*, those plants, the seeds of which have more than two lobes: the number of these is small; the *hemlock* and the *pine* are examples.

388. The *Embryo*, is the most important part of the seed, as it produces the new plant; all other parts seem but subservient to this, which is the point from whence the life and organization of the future plant originate. In most dicotyledonous seeds, as the bean, orange, and apple, the embryo may be plainly discovered. Its internal structure, before it begins to vegetate, is

382. What does Fig. 64 represent?
 383. What are cotyledons?
 384. What plants are called Acotyledons?
 385. What are Monocotyledons?
 386. What are Dicotyledons?
 387. What are Polycotyledons?
 388. Give an account of the embryo.

very simple, consisting of a uniform substance enclosed in its appropriate bark or skin. When the vital principle is excited to action, vessels are formed, and parts developed, which seemed not previously to have existed. The embryo is usually central, and enclosed by the cotyledons; sometimes it is no more than a mere point or dot, and in some cases, altogether invisible to the naked eye. The embryo consists of two parts.

389. 1st. The *Plume*, is the ascending part, which unfolds itself into herbage.

Fig. 65.



390. 2d. The *Radicle* is the descending part, which unfolds itself into roots. At Fig. 65 appears the embryo in a germinating state; *a* represents the radicle, *b* the plume, *c* the cord by which the plant is still connected with the cotyledons, and receives from them its nourishment.

To use the words of an ancient botanist, "the embryo continues imprisoned within its seed, and remains in a profound sleep, until awakened by germination; it meets the light and air to grow into a plant, similar to its parent."

There are various *appendages* which may, or may not, be present without injury to the structure of the seed.

391. *Aigrette*, or *egret*, sometimes called *pappus*, is a kind of feathery crown with which many of the compound flowers are furnished, evidently for the purpose of disseminating the seed to a considerable distance by means of winds; as the dandelion. The egret includes all that remains on the top of the seed after the corolla is removed.

392. *Stipe* is a thread connecting the egret with the seed. The egret is said to be *sessile* when it has no stipe, *simpli* when it consists of a bundle of hairs without branches, *plumose* when each hair has other little hairs arranged along its sides, like the beards on a feather.

389. Describe the plume.

390. Describe the radicle.

391. What is the egret?

392. What is the stipe?

Fig. 66.



393. In Fig. 66, *a* represents the *capillary*, or hair-like egret, *b* the *plumose*, or feathery egret; *c* and *d* show the style remaining, and forming a *train*, as in the Virgin's bower and Geum; *e* represents a wing, as may be seen in the fir and maple; and *f* a sessile egret.

General Remarks upon Seeds.

394. The number of seeds in different plants is variable; some have but one; some, like the umbelliferous plants, have two; some have four, as in the rough-leaved plants; in the order Gymnospermia, of the class Didynamia, there are four lying naked in each calyx. The number varies from these to thousands. A stalk of Indian corn is said to have produced in one season, two thousand seeds. It has been calculated that a single Thistle seed will produce, at the first crop, twenty-four thousand, and at the second crop, at this rate, five hundred and seventy-six millions.

395. Seeds are of various sizes, from that of the cocoa-nut, to a fine dust, as in the mosses.

396. The period at which seeds arrive at maturity, marks the decay of annual plants, and the suspension of vegetation in wood, and perennial plants. Nature, in favouring by various means, the dispersion of these seeds, presents phenomena worthy of our admiration, and those means are as varied as the species of seeds which are spread upon the surface of the earth.

397. The air, winds, rivers, seas, and animals, transport seeds and disperse them in every direction. Seeds provided with feathery crowns, (*egrets*), as the Dandelion and Thistle, or with wings, as the Maple and Ash, are raised into the air, and even carried across seas. Linnæus asserted that a certain

393. What is represented by Fig. 66?

394. What is remarked respecting the variation in the number of seeds?

395. What is said of the different sizes of seeds?

396. What marks the decay of annual plants?

397. How are seeds transported in various directions?

plant of the compound family was introduced into Europe from America, by seeds wafted across the Atlantic Ocean. "Seeds," says Linnæus, "embark upon the rivers which descend from the highest mountains of Lapland, and arrive at the middle of the plains, and the coasts of the seas. The ocean has thrown even upon the coasts of Norway, the nuts of the Mahogany, and the fruit of the cocoa nut tree, borne on its waves from the far distant tropical regions; and this wonderful voyage has been performed without injury to the vital energy of the seeds."

398. Animals also perform their part in the diffusion of seeds. Squirrels and other animals carry seeds and nuts into holes in the earth. The Indians believed that the squirrels planted all the timber in the country: there is no doubt but that they do much towards diffusing different kinds of nuts and seeds; as Chestnut, Oak, Walnut, &c. Animals contribute also to the distribution of seeds by conveying them in their wool, fur, or feathers.

399. The diffusion of seeds completes the circle of vegetation, and closes the scene of vegetable life. The shrubs and trees lose their foliage—the withered herbs decompose, and restore to the earth the element which they have drawn from its bosom. The earth, stripped of its beauty, seems sinking into old age; but although unseen by us, and unmarked the processes of nature by too many among men, innumerable germs have been formed, which wait but the favourable warmth, to decorate with new brilliancy this terrestrial scene.

400. So fruitful is nature, that a surface a thousand times more extended than that of our globe, would not be sufficient for the vegetables which the seeds of one single year would produce, if all should be developed;—but the destruction of seeds is very great, great quantities being eaten by man and beast; or left to perish in unfavourable situations. Those which are preserved, constitute but a small proportion of the whole; they are either carried into the clefts of rocks, or buried beneath the ruins of vegetables; protected from the cold, they remain inactive during winter, and germinate as soon as the early warmth of spring is felt.

401. At this season the botanist who considers with a curi-

398. Do animals assist in dispersing seeds?

399. What is remarked of the appearance of vegetation at the time of the diffusion of seeds?

400. Would the earth afford sufficient space for all the seeds which one year produces to vegetate?

401. What are the reflections of the botanist on beholding the plants which appear on the return of Spring?

ous eye the vegetable species with which the earth begins to be clothed, seeing successively all the types or representations of past generations of plants, admires the power of the Author of nature, and the immutability of His laws.

CHAPTER XVI.

Germination of the Seed.

402. WE have now considered the various organs of plants, we have traced them through their successive stages of development, from the root to the bud, leaf, and flower, and from the flower to the fruit and seed. We have seen in imagination, the vegetable world fading under a change of temperature, the "sear and yellow leaf," a prey to the autumnal blasts; and even the fruits themselves, exhibiting a mass of decayed matter. Were this appearance of decay and death, now presented to us for the first time, how gloomy would be the prospect! How little should we expect the return of life, and beauty, and fragrance! No power short of Omnipotence, can effect this miracle.

403. But we are now so accustomed to these changes, that "seeing, we perceive not;" we think not of the mighty Being, who produces them: we call them the *operations of nature*, and what is *nature*, or what are the *laws of nature*, but manifestations of Almighty power?

404. The word *nature*, in its original sense, signifies *born or produced*; let us then look on nature as a created thing, and beware of yielding that homage which is due to the Creator. The sceptic, with seeming rapture, may talk of the beauties of nature, but cold and insensible must be that heart, which from the contemplation of the earth around, and "the heavens above, soars not,

"To him, the mighty Power from whom these wonders are."

405. How beautifully is the re-animation of the vegetable world, used by St. Paul, as an illustration of our *resurrection from the dead!* The same power, which from a small, dry,

403. Why are mankind so forgetful of the Great Being who produces the wonderful changes which nature presents?

404. What is the meaning of the word *nature*, and how should we regard it?

405. What should remind us of the resurrection from the dead?

and apparently dead seed, can bring forth a fresh and beautiful plant, can also from the ruins of our mortal bodies produce a new and glorious body, and unite it to the immortal spirit by ties never to be separated.

Germination.

406. The process of the shooting forth of the young plant from the seed is termed *Germination*.

407. The principal of life contained in the seed does not usually become active, until the seed is placed in circumstances favourable to vegetation.

408. When a seed is committed to the bosom of the earth, its various parts soon begin to swell by absorbing moisture.—A chymical action then commences; *oxygen* from the air unites to the *carbon* of the seed, and carries it off in the form of *carbonic acid gas*.

409. As the carbon of the cotyledons continues to diminish, and oxygen is produced in excess, a sweet, sugar-like substance is formed; this is conveyed to the embryo, which by its new nourishment is kindled into active life; from this period we may date the existence of the *young plant*. Bursting through the coats which surround it, and which are already enfeebled by their loss of carbon, the embryo emerges from its prison, the *radicle* shoots downward, and the *plume* rises upwards. We say then that the seed has come up or sprouted.

410. Fig. 67 represents a young dicotyledonous plant, with its radicle, *a*, developed; its plume, *b*, is yet scarcely perceptible; its cotyledons, *c*, appear in the form of large, succulent seed-leaves.

406. What is germination?

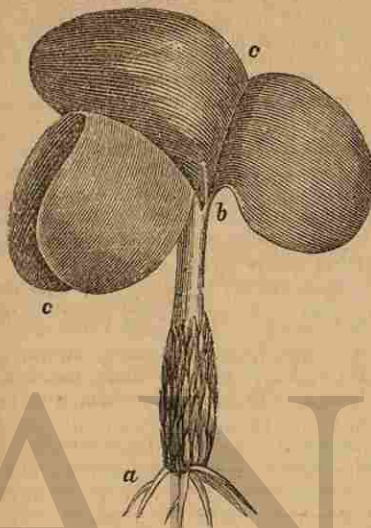
407. What is necessary for the vegetation of the seed?

408. What changes occur when the seed is placed in the earth?

409. What kindles the embryo into active life?

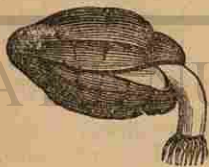
410. What does Fig. 67 represent?

Fig. 67.



wards. It is supposed that if the root met with no obstruction in going downwards, it would always be perfectly straight.

Fig. 68.



413. Fig. 68 is the representation of a germinating seed of the Four o'clock; it will be seen that the radicle, *a*, has made nearly a right angle in turning downwards; the plume is not developed.

414. If you put into a tumbler of water some cotton, and place upon it some seeds of rice or wheat, you will see all the fibres shooting from the seeds, in a perpendicular direction, downwards. It is a very simple and interesting experiment. Some ascribe this phenomenon to the laws of gravitation, by which the root is attracted towards the centre of the earth; others say that the radicle, stimulated by moisture, naturally extends itself in the direction from which

411. What direction does the radicle take?

412. What experiment did a botanist make with acorns?

413. What does Fig. 68 represent?

414. What experiment is mentioned, and what are some of the causes assigned for the downward course of the radicle?

the moisture proceeds; while some imagine that the plant is endowed with a kind of instinct, similar to that which appears in animals, leading the little duck to seek the water, and birds to attempt to fly; but let us call this power by what name we will, or refer it to whatever secondary laws, we must after all attribute it to the will and design of Him, who gave the plant a principle of life.

415. After the young root has made some progress, the cotyledons swell, and rising out of the ground, form two green leaves, called *seed leaves*. You have no doubt noticed their appearance in the garden bean, when it first appears above the ground.

416. When the plume develops its leaves, these seed-leaves, being no longer needed, wither and decay.

417. You will recollect that the embryo or germ is composed of two parts, the radicle and the plume. The radicle, we have just seen, extends itself downwards. Soon after this part of the germ has begun its downward course, the plume, (so called from its resembling a little feather,) rises upwards, and soon becomes a tuft of young leaves, with which the stem, if there is one, ascends.

418. Some moisture is essential to the germination of the seed, though different plants require different quantities. Water softens the envelopes of the seed, swells the kernel, and causes it to burst. Too much water produces a decay or rot in the seed so rapidly, that the living principle is destroyed rather than brought forward; hence it is better to sow seeds in dry rather than wet weather. *Earth*, though not absolutely essential, is useful, as affording to the vegetable egg a favourable situation, where it may receive the influence of the various agents, which are to perform their offices in the development of its parts. Some plants vegetate without earth. The parasite grows upon the barks of other plants; many seeds vegetate in water, and some, when moistened and placed on cotton, or any other supporting substance.

419. *Air* is essential to vegetation; under an exhausted receiver a seed will not germinate, although possessing every other requisite. Seeds that become imbedded deeply in the ground do not vegetate, unless accidentally ploughed up, or exposed to the atmosphere. Acorns, supposed to have lain for centuries, have germinated as soon as they were raised sufficiently near the surface to receive the influence of air. You will recollect,

415. When do the seed leaves appear?
 416. When do the seed leaves decay?
 417. What direction does the plume take?
 418. What effect has water upon the vegetation of the seed?—Is earth essential to vegetation?
 419. Is air necessary to vegetation?

that in the process of germination, *oxygen gas* unites with the carbon of the seed, and carries it off in the form of carbonic acid. Air furnishes that important agent, oxygen, which is the first moving principle of life.

420. Carbon constitutes the greater part of the substance of seed; and this principle being in its nature opposed to putrefaction, prevent seeds from rotting, previous to their being sown. Some seeds having abundance of carbon, are capable of being preserved for ages: while others, in which this element exists but in small proportions, require to be sown almost as soon as ripe; and such as are still more deficient in carbon, lose their vital principle before separating from the pericarp.

421. Oxygen is important to germination, on account of its agency in removing the carbon which holds the living principle of the seed in bondage.

422. The *absence of light* is unfavourable to the germination of seeds; for light acts upon plants in such a manner as to take away oxygen by the decomposition of carbonic acid gas, and to deposit carbon; now this is just the reverse of the process required in germination, where the carbon must be thrown off and the oxygen in excess.

423. A certain degree of *heat* is necessary to germination. Seeds planted in winter, will remain in a torpid state; but as soon as the warmth of spring is felt, the embryo emerges into life. By increasing heat, seeds may be hastened in their vegetating process; thus the same seed, which with a moderate degree of heat would germinate in nine hours, may be brought to this state in six hours, by an increase of temperature. Too great heat destroys the vital principle; thus corn which has been roasted can never be made to vegetate.

424. There is a great difference in plants as to their *time of germinating*; some seeds begin to vegetate before they are separated from the pericarp.* In the greater number of vegeta-

* In the month of January, on observing the seeds of a very fine juicy apple, which had been kept in a warm cellar, I saw that they were swollen, and the outward coat had burst; examining one seed by removing the tegument and separating the cotyledons, I saw by the help of a microscope the embryo, as if in a germinating state; the radicle was like a little beak; in the upper part or plume was plainly to be seen the tuft of leaves and the stem.

420. What constitutes the greater part of the substance of the seed?
 421. Why is oxygen necessary to germination?
 422. Is light favourable to vegetation?
 423. Is heat necessary to vegetation?
 424. What is said of the difference in plants with respect to the time of germination?

bles, however, there is no germination until after the opening of the pericarp and the fall of the seed. The time at which different species of seeds, after being committed to the earth, begin to vegetate, varies from one day, to some years. The seeds of grasses, and the grain-like plants, as rye, wheat, corn, &c. germinate within two days. Cruciform plants, such as the radish and mustard, the leguminous, as the pea and bean, require a little more time. The peach, walnut, and peony, remain in the earth a year before they vegetate.

425. All kinds of plants germinate sooner if they are sown immediately after being separated from the pericarps, than if kept some time.

426. The seeds of most vegetables preserve their living principle for years: some lose it as soon as they are detached from their pericarps. This is said to be the case in the coffee and tea. The seeds of some of the grasses, as wheat, &c. are said to retain their vital principle even for centuries. It is asserted that mosses, kept for two hundred years in the herbariums of botanists, have revived by being soaked in water.

427. An American writer says that "seeds, if imbedded in stone or dry earth, and removed from the influence of air or moisture, might be made to retain their vegetative quality or principle of life for a thousand years." But he adds, "life is a property which we do not understand: yet life, however feeble and obscure, is always life, and between it and death there is a distance as great as existence and non-existence."

428. Before commencing the study of botany, when you looked at the trunk of a tree, a little herb, or a leaf, you probably considered it very simple in its structure; you saw it only as one mass; but you now perceive that plants, like animals, consist of collections of fibres; that they have parts which in some respects are like our skin, bones, flesh, and blood; that they are living organized beings, and like animals, are subject to life and death.

429. Plants differ from animals, in possessing none of the organs of sense. They can neither see, hear, taste, smell, nor

† B. Barton.

425. Is it better that seeds should be kept sometime before they are sown?

426. Are seeds alike with respect to retaining their living principle?

427. What is remarked by an American writer respecting the life of seeds?

428. Do you regard plants now in the same manner as before you began to study them?

429. How do plants differ from animals, and how do they resemble them?

touch. Some vegetables, however, seem to have a kind of sensibility like that derived from the organs of touch in animals, they tremble and shrink back upon coming in contact with other substances; some turn themselves round to the sun, as if enjoying its rays. There is a mystery in these circumstances which we cannot penetrate; and it is not yet fully known at what point in the scale of existence animal life ends, and vegetable life commences.

CHAPTER XVII.

General Principles of Classification—Natural Families of Plants.

420. LET us now imagine the whole vegetable kingdom, comprising innumerable millions of individual plants, to be spread out before a botanist. Could he, in the course of the longest life, number each blade of grass, each little moss, each shrub, or even each tree? If he could not even count them, much less could he give each one a separate name and description. But he does not need to name them separately, for he sees that nature has arranged them into *sorts* or *kinds*.

431. If you were sent into the fields to gather flowers of a similar kind, you would need no book to direct you to put into one parcel, all the *red clover* blossoms, and into another, the *white clover*; while the *dandelions* would form another group. These all constitute different *species*. Nature would also teach you that the red and white clover, although differing from each other in some particulars, yet bear a strong resemblance.

432. By placing species together you form a *genus*, and to this *genus* you refer all the different kinds of clover. When you see red, damask, and cinnamon roses, you perceive they all have such strong marks of resemblance as to entitle them to be placed together in one genus.

433. But yet you know that the seed of a damask rose would never produce a red rose. One species of plants can never produce another species, however near may be their resemblance.

434. The whole number of *species* of plants which have

430. Is it necessary for the botanist to give a particular name to every plant?

431. Do you need a book to teach you to put flowers of the same sort together?

432. How is a genus formed?

433. Does one species ever produce plants of another species?

434. What number of species have been discovered?

been named and described, including many which have been recently discovered in New Holland and about the Cape of Good Hope, is said to be 56,000.

435. If species of plants were described without any regular order, we could derive no pleasure, and very little advantage, from the study of practical botany. If we wished to find out the name of a plant, we should be obliged to turn over the leaves of a large volume, without any rule to guide us in our search.

436. The necessity of some kind of system was so apparent, that many attempts for the methodical arrangement of plants, were made, before the time of Linnæus; but his system was so superior to all others, that it was no sooner published to the world, than it was adopted by the universal consent of all men of science.

437. This system not only includes within it all known plants, but is founded on such principles as must comprehend within it whatever plants may yet be discovered. Its author believed that no plant was destitute of stamens and pistils: but at the same time, that there were species in which these organs were so small, so obscure, or of such a singular formation, as to render it difficult, and sometimes impossible, to be certain of their existence, except by the principle of analogy.

438. Linnæus made two grand divisions of plants, *Phengamous*, such as have stamens and pistils *visible*, and *Cryptogamous*, stamens and pistils *invisible*.

439. The following comparison has been very properly made in illustration of the divisions in the system of Linnæus

Classes are compared to States.

Orders, to Towns.

Genera, to Families.

Species, to Individuals.

440. You must not forget, while you are studying botany that plants themselves are the only real substances; species, genus, order, and class, are mere abstract terms, denoting certain distinctions which would equally have existed, although we had never observed them, or given them names.

435. What would be the consequence if species were described without regularity?

436. Were any attempts at a methodical arrangement of plants made before the time of Linnæus?

437. Does the system of Linnæus provide for the arrangement of plants not yet discovered?

438. What two grand divisions of plants did Linnæus make? Q. L.

439. How may the divisions in botany be illustrated?

440. Which are the only real substances that are considered in botany?

441. An *Individual* is an organized being, complete in its parts, distinct and separate from all other beings. An oak, a rose, and a moss, are each of them individuals of the vegetable kingdom.

442. A *Species* includes such individuals as agree in certain circumstances of the roots, stems, leaves, and inflorescence. We have no reason to suppose that any new species, either of animals or vegetables, have been produced since the creation. We sometimes see *varieties* in plants made by cultivation; the stamens and pistils, from excess of nourishment, expanding into petals. Varieties are also occasioned by strewing the pollen from one species, upon the stigma of another; but these varieties do not produce perfect seed, and therefore cannot reproduce themselves by their seed. Colour, taste, and size, are not considered as marks of specific difference.

443. A *Genus* comprehends one or more species, grouped together on account of some resemblance in situation, proportion, and connexion of the organs which constitute the flower. Any one species of a genus may be regarded as a type or example of the others; we may easily refer species which we have not studied to their proper genus, by a knowledge of any one species of that genus. Some genera appear to be distinctly marked by nature; the various species of the rose, form a beautiful genus which is known to all, although every one might not be able to describe it to others, in such a manner as to be understood; it is chiefly distinguished by its urn-shaped, fringed calyx.

444. The generic names of plants are derived from various circumstances; in some cases from a peculiarity of form, or colour of the corolla or some property of the plant. Some genera are named from distinguished persons. Iris, (Flag,) is named from Iris the rainbow on account of its various shades of colour. Digitalis, (Fox-glove,) is named from *digitus* a finger, on account of the shape of its corolla, like the finger of a glove. Convallaria, (Lily of the valley,) is named from the Latin *convallis*, signifying valley. The name of the great Linnæus is commemorated in a beautiful but modest and humble flower called the *Linnæa borealis*.*

* *Borealis*, signifying *northern*, has reference to the situation of Sweden, the country which gave birth to Linnæus. The *Linnæa borealis* is not uncommon in New England, and has been found on an island near Troy, in the State of New-York.

441. What is an individual?

442. What is a species?

443. What is a genus?

444. How are the generic names derived?

445. Specific names are generally *adjectives*; generic names are *nouns*. The specific name sometimes indicates the number of leaves, as *ORCHIS bifolia*, (*bifolia*, signifies two leaves,) or the colour of the corolla; as *VIOLA tri-color*, (three coloured Violet,) or the form of the root; as *SOLANUM tuberosum*; (potato with a tuberos root.) Specific names are also derived from the names of persons; thus a species of the genus *Bidens* is named *Beckii*, in honour of Dr. Beck, a botanist of the state of New York.

The name *RENSELERIA* has lately been given to a newly discovered genus; this is called after Mr. Van Rensselaer a distinguished patron of American science.

Natural Method.

446. The natural method consists in bringing together such plants as seem by nature to constitute one family, resembling each other in general appearances and medicinal qualities; as lilies, herbs, trees, mosses, and ferns. Some of these natural families show a similarity in form and quality, and are evidently distinct from all others. If the whole vegetable kingdom could thus be distributed into natural tribes, we should need no other system than that of nature. But as we proceed on this plan we soon find difficulties; for, after selecting a few families which nature seems to have formed with striking marks of resemblance, we find others, less distinctly marked, and we at length see a vast number of plants which cannot be referred to any natural families.

447. It is by their natural characters, that persons who have never heard of such a science as *zoology*, or the classification of animals, are enabled to distinguish ferocious beasts from domestic and gentle animals; they see a sheep or a cow without any terror, although that individual one they may never have seen before; for nature teaches them to consider, that, as resembling other sheep and cows, which they know to be inoffensive.

448. This natural character teaches savages to distinguish among the many plants of the forest, those which may administer to their wants, and those which would be injurious.

445. What is said of specific names?

446. Give some account of what is called in Botany the Natural Method.

447. How do persons ignorant of the science which classes animals distinguish ferocious beasts from domestic animals?

448. Of what use is the natural character of plants to Savages?

450. Even the lower grade of animals have this faculty of selecting by natural characters, nutritious substances, and avoiding noxious ones; thus we see the apparently unconscious brutes luxuriating in the rich pastures prepared for them by a benevolent Creator, cautiously passing by the poisonous weed, directed by the curious instinct given them by 'his same Almighty Benefactor.

CHAPTER XVIII.

Natural Families

450. A *natural family* is composed of several genera of plants which have some common marks of resemblance, and its name is usually founded upon this general character; as *Labiata* and *Cruciform*, which are derived from the form of the corollas; *Umbellate* and *Corymbiferous*, from the inflorescence; *Leguminous*, from the nature of the fruit.

451. Natural families resemble artificial orders in being composed of genera, but the principles on which the genera are brought together, differ widely in the two cases.

452. In many natural families, the classification is such as persons who have never studied botany, might make; thus, dill, fennel, caraway, &c., belong to the *umbellate* family, on account of the form in which the little stalks, bearing the flower, and afterwards the seed, branch out from one common centre, like the sticks of an umbrella; this general resemblance is observed by all, and it seems very natural to class such plants together.

453. But in the artificial orders, genera which may be very unlike in other respects, are brought together from the single circumstance of their having the same number of stamens and pistils. Thus, in the first order of the 8th class, we have the Tulip and the Burlish, the Lily of the valley and the Sweet-flag. In the second order of the 5th class, we have the Beet and the Elm. You will at once perceive the want of resemblance.

449. Are animals capable of distinguishing plants by their natural characters?

450. What composes a natural family of Plants, and on what is its name often founded?

451. How do families resemble artificial orders?

452. Could a person ignorant of botany form a classification of plants into natural families?

453. How are genera brought together in the artificial orders?

balance in the general appearance of these plants, and that an arrangement, which thus brings them together, is properly called an *artificial* method.

454. Many families of plants possess a marked resemblance in form and qualities, and appear evidently as distinct tribes. If the whole of the vegetable kingdom could thus be distributed into natural classes, the study of botany would be much simplified; but it has already been remarked, that there are many plants which cannot be thus arranged, and no principle has yet been discovered for systematic arrangement, which bears any comparison to the Artificial System.

455. Here plants are conveniently arranged, like words in a dictionary, and thus easily found out and referred to their natural classes: no other system exists which can with certainty direct us to these classes.

In commencing our remarks upon some of the natural families, we will first consider the

LILIACEOUS FLOWERS.

456. These flowers consist of six petals, spreading gradually from the base, and exhibiting a kind of bell-form appearance but differing from the bell-form flowers in being polypetalous.

457. The number of stamens in the Liliaceous plants is generally six, sometimes but three; they are usually alternate with the petals.

458. The germ of the Liliaceous plants is always of a triangular form, and contains three cells; the roots are mostly bulbous.

459. The Lily has a scaly bulb, the Onion a tunicated or coated bulb, the Tulip has a bulb which seems almost solid and tuberous.

460. The calyx is mostly wanting in Liliaceous plants, the stems are simple without branches; the leaves entire, and nerved. To this family belong the Tulip, Lily, Crown-imperial, Dog-tooth-violet, &c. Plants of this natural family usually belong to the class Hexandria; the Crocus having three stamens, belongs to the class Triandria.

454. Can all plants be easily arranged in distinct tribes?
 455. How are plants arranged in the artificial system?
 456. Describe the corolla of liliaceous flowers.
 457. What is said of the stamens of liliaceous plants?
 458. What is said of the germ?
 459. Of the root or bulb?
 460. Of the calyx, stems, leaves, &c.?

CRUCIFORM FLOWERS.

461. These are such flowers as have a calyx consisting of four leaves, and a corolla composed of four petals; each petal is fastened to the receptacle or bottom of the calyx by a narrow part called the claw. In the centre of the flower is a single pistil long and cylindrical; the stigma is oblong, and divided into two parts, which are reflexed or bent back on each side. Each petal is placed between two leaves of the calyx; this alternate position is always seen in flowers where the number of petals equals the number of leaves of the calyx.

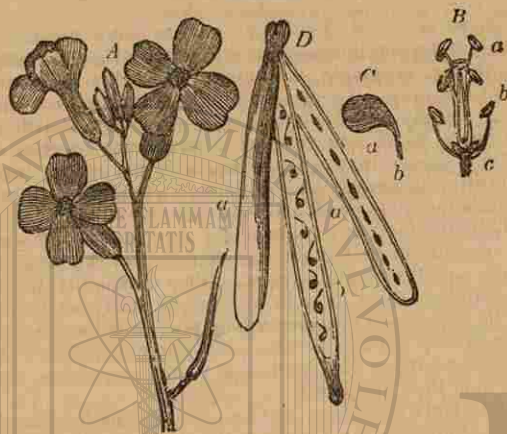
462. The cruciform flowers have six stamens, two of which, standing opposite to each other, are shorter than the remaining four, which always stand in pairs. This inequality in their length determines them to be in the class Tetradynamia.

463. The germ soon becomes a long pod, called a *siliqua*, or a short, thick one, called *silicula*; this difference in the length of the pods constitutes the distinction of the two orders of the class in which they are placed.

464. The plants belonging to this class are herbaceous, the leaves are alternate; the Cabbage, the Mustard, the Radish and Stock-gilly-flower, belong to this family. They are found on a chymical analysis, to contain some sulphur.

461. What are cruciform flowers?
 462. What is said of their stamens?
 463. What is said of the germ?
 464. What of the leaves, &c.?

Fig. 69.



465. Fig. 69, A represents a flower of the cruciform family; a B, may be seen the stamens arranged in two sets, the four at a being longer than the two at b; at c, are two glands between the short stamens and the germ; at C, is a petal, consisting of a, the border, and b, the claw; at D, is the pod or silicle; a, represents the valves, b, the seeds, as alternately attached to the edges of the partition or dissepiment which divides this kind of pericarp into two cells.

PAPILIONACEOUS FLOWERS.

466. These are so called from a Latin word *papilio*, a butterfly, on account of the supposed resemblance between them and that insect; they are generally flowers with brilliant colouring, and of a showy appearance. The sweet-pea may be given as an example; this unites to delicacy of colour and beauty of form, a highly fragrant perfume.

467. The flowers belonging to this natural family are so peculiar in appearance as to make them easily recognized. The Rose, the Pink, and the Bell-flower, are regular in their form, that is, there is a symmetry and equality in their parts. Irre-

465. What does Fig. 69 represent?
 466. Describe the papilionaceous flowers
 467. Are these flowers regular?

gular corollas are various in their forms; the papilionaceous seem, as they stand upon their stem, to consist of an upper and under part.

468. In examining a flower of this kind, a Pea, for example you should first observe the calyx, this is monosepalous, that is, one entire sepal, ending in five distinct leafy points; the two upper ones wider than the three under ones. The calyx bends towards the lower part, as does also the peduncle, or little stalk which supports it. The peduncle is very flexible; so that the flower readily avoids facing a current of air, and turns its back to the wind and rain.

469. In examining the corolla, you will see that it is *polyptalous*. The first piece is a large petal covering the others, and occupying the under part of the corolla; it is called the *standard* or *banner*. This petal is evidently designed, to protect the stamens and other parts of the flower, from the injuries of the weather. Upon taking off the banner you will find that it is inserted by a little process, or projecting part, into the side pieces, so that it cannot be easily separated by winds. The banner being taken off, the two side pieces to which it adhered are exposed to view; these are called the *wings*; they are strongly inserted into the remaining part of the corolla, and their use appears to be, that of protecting the sides of the flower. Upon taking off the wings, you will discover the last piece of the corolla, called, on account of its form, the *keel*, or *boat*. This covers and protects the stamens and pistils.

470. Upon drawing the keel downwards, you will find ten stamens; they are joined together by the sides of their filaments, appearing like a cylinder surrounding the pistil.

471. One of these stamens, however, does not adhere to the rest; but as the flower fades and the fruit increases, it separates and leaves an opening at the upper side, through which the germ can extend itself by gradually opening the cylinder. In the early stage of the flower, this stamen will seem not to be separated; but by carefully moving it with a pin or needle, its filament will be found unconnected with the other nine.

472. Most of the papilionaceous plants belong to the class Diadelphia, order Decandria. But if the flower, although papilionaceous, should have ten stamens all in one set, it is then placed in the class Decandria. According to this arrangement, a very striking natural family of plants is widely sepa-

468. What are the appearances presented by a pea flower?
 469. What may be seen by examining the corolla of a pea?
 470. How many stamens does this flower contain?
 471. Do they all adhere together?
 472. To what class do most of the papilionaceous flowers belong?

rated, a part being taken from the 16th class and carried to the 10th.

473. The germ of the papilionaceous plant extends itself into that kind of pod called a *legume*. The term Leguminous, which is taken from the fruit, as Papilionaceous is from the flower, is applied to the family of plants we are considering.

474. In this family we find the fine table vegetables, Beans and Peas, the useful medicinal plant, Liquorice, the fine colouring Indigo, the fragrant Clover, so grateful as food to many of the domestic animals; the splendid Locust tree, the elegant Lu pine, and the delicate and odoriferous Sweet-pea.

CHAPTER XIX.

Natural Families.—Labiata Plants.

475. The flowers belonging to the *labiate* family are monopetalous, consisting of one piece, and are irregular in their outline and appearance.

476. The term Labiate, derived from a Latin word *labia*, lips, has been given, on account of the flower appearing to be divided at the top into two parts, resembling the lips of a horse or other animal. See Fig. 47.

477. This natural family is sub-divided into *ringent* and *gaping*, where the entrance into the corolla is open, and *personate* or *masked*, where the corolla is closed by a prominent throat or palate.

478. The labiate flowers have mostly four stamens of unequal length, standing in pairs, beneath an arch in the upper lip of the corolla. On account of this circumstance, they are ranked in the class Didynamia. A few of the Labiate plants have but two stamens, and on that account, are placed in the class Diandria, as the sage and mountain-mint. Here again the artificial system separates a tribe, which nature has made strikingly similar. If you examine a flower of this family, the Balm or Catmint, you will notice the arched upper lip of the petal covering the stamens, and that the lower lip hangs down so that you can see

473. What does the germ of the papilionaceous plants become?

474. What are some of plants found in this family?

475. What is said of the flowers belonging to the labiate family?

476. Why are they called labiate?

477. How is this family sub-divided?

478. What is said of the stamens of labiate flowers, and to what class do these flowers belong?

the inside of the corolla. If you pull out the corolla you will take the stamens along with it, the filaments being attached to it, as they usually are to monopetalous corollas. The corolla has a small aperture at the base, through which the pistil grew from the receptacle.

479. You have already been informed that the Labiate flowers belong chiefly to the class Didynamia. The ringent division of plants belongs to the order Gymnospermia, having four seeds, lying naked in the calyx. The personate division belongs to the order Angiospermia, having the seeds inclosed in a capsule until they are ripe, when the capsule opens spontaneously and disperses them.

480. The ringent flowers generally grow in whorls or circles, and at the upper part of an angular stem, the leaves standing opposite. These plants are never poisonous. Among them we find many aromatic plants, the Peppermint, Lavender, Savory, Majorum, Thyme, &c.; also many herbs which are useful in sickness, as Pennyroyal, Catmint, Horshound, &c.

481. The personate division affords some very splendid flowers, as the beautiful Gerardia, or American Foxglove, and the magnificent Bignonia, (Trumpet flower.) The plants of this order seem to be somewhat allied to those of the class Pentandria, in many of these, as in the Snapdragon, (Antirrhinum,) the Pentstemon, &c., there exists the rudiments of a fifth stamen, in accordance with the five divisions of the calyx and corolla. Some plants of this division of the Labiate family are poisonous, as the Foxglove and the Snapdragon.

UMBELLATE PLANTS.

482. The plants of this natural family are found in the artificial class Pentandria; they derive their name from the Latin word *umbella*, an umbrella, on account of the manner in which the peduncles of the flower stalks spread out from the main stem. See Fig. 56, b.

483. The umbellate plants are mostly herbaceous, those which grow on dry ground are aromatic, as Dill, Fennel, and Caraway; those which grow in wet places, or the aquatic species, are among the most deadly poisons, as Water-Hemlock, &c. Plants of this family are not in general so beautiful to the

479. What are the orders in this class?

480. What is said of the ringent flowers?

481. What is said of the personate division?

482. In which class are the umbellate flowers found and from whence then do they take their name?

483. Describe these plants.

sight, nor so interesting as many others. The corolla is superior, or over the germ, consisting of six petals, usually with a stamen standing between each petal. From the centre of the flower arise two styles, which often remain permanent upon the fruit.

484. The general figure of the fruit is oblong or oval; it separates perpendicularly into two seeds, as may be seen in the Fennel or Dill. The figure, margin, and angles of the seeds are considered as affording proper characters of the genera; as in the Parsnip they are flat, in the Carrot bristly, in the Hemlock marked with ridges. Among the plants of this family which are used as articles of food, are the Carrot, Parsnip, Celery, and Parsley; the aromatics are Dill, Fennel, Sweet Cicely, Caraway, and Coriander; and among the poisonous plants, are the Conium, (Poison Hemlock,) Water-Parsnip, and the Cicuta, (Water-Hemlock.)

COMPOUND FLOWERS.

485. The flowers of this family begin to blossom in the latter part of summer, and are found almost bordering upon the verge of winter. The Dandelion is among the earliest flowers of spring, and one of the latest of autumn. The Daisy, in its native country, is found in almost every spot which exhibits any marks of fertility; but with us is nowhere found except in gardens.

486. The Dandelion is not a single flower like a violet or rose, but a crowded cluster of little flowers. The Sunflower is so large and conspicuous, as doubtless to have frequently attracted your notice. If you examine one carefully, you will find it to be composed of more than a hundred florets or little flowers, each as perfect in its kind as a lily, having its corolla, stamens, pistils, and seed.

487. We distinguish the Sunflower into two parts—the *disk*, which is the middle of the flower, and supposed to have a resemblance to the middle or body of the sun; the *ray* is the border of the flower, it contains those florets which spread out from the disk as rays of light diverge from the sun. The florets in this, as in other compound flowers, do not all begin to expand at the same time, they usually begin at the disk, and proceed inwards towards the centre.

484. What is observed of the fruit of the umbellate plants?

485. What is said of the blossoming of compound flowers?

486. How do the dandelion and sunflower differ from the violet and rose?

487. Into what two parts would you distinguish the sunflower?

488. If you examine with a microscope one of the florets of the disk, you will perceive it to be tubular, containing one pistil, surrounded by five stamens, the styles of which are separate, but the five anthers grow together, forming a tube around the pistil. It is this union of anthers which gives to compound flowers a place in the class Syngenesia, which name signifies anthers growing together.

489. The florets of the ray are called *neutral*, having neither stamens nor pistils; the circumstances of its having neutral florets in the ray, places the Sunflower in the order *Frustranea* of the 17th class.

490. Although the term *compound* is applied to the flowers of the class Syngenesia, the real circumstance on which the class is founded is not the compound character of the flower, but the union of anthers.

491. A Clover blossom, in one sense, may be said to be compound, as it is a collection of many little flowers compounded or united into one; but each little floret of the clover has its own calyx; there is no general calyx inclosing the whole, as in most of the Syngenesious plants, but the florets are arranged in such a manner as to form a head; the anthers are separate, the filaments are connected at their sides, and this latter circumstance, together with the papilionaceous form of the corolla, places the clover in the class Diadelphia.

492. Most of the Syngenesious flowers are composed of two sorts of florets; they are either *tubular*, or *strap* shaped, (*ligulate*), appearing flat like a strap, both kinds are toothed at the edge; the ligulate are sometimes called Semiflorets, or half flowers.

488. What is the appearance of the florets of the disk when examined by a microscope?

489. Why are florets of the ray called neutral?

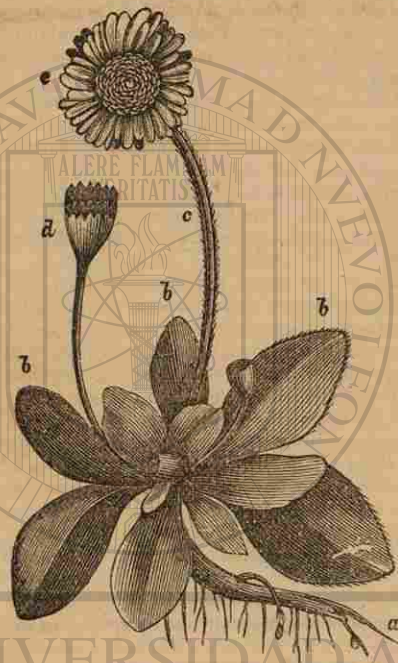
490. Is the class Syngenesia founded on the compound character of flowers?

491. Why does not the clover belong to this class?

492. What two sorts of florets are generally found in Syngenesious plants?

Analysis of the Daisy.

Fig. 70



495. 3. The *Stem, c*, is called a *scape*, because it springs directly from the root, and bears no leaves.

496. 4. The *Calix, d*, is said to be *hemispherical*, or a half sphere; it is *common*, that is inclosing many florets; the leaflets of the calyx, sometimes called scales, are *equal*, or of the same size.

497. 5. The *Corolla, e*, is *compound*, having many florets on one receptacle, *radiate*, having rays; the florets of the disk

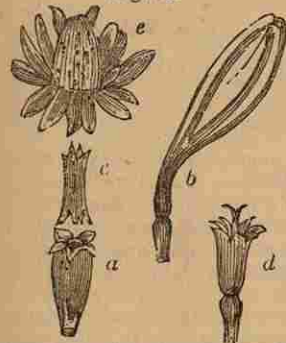
493. What kind of root has the daisy?
 494. Describe its leaves.
 495. What kind of stem has the daisy?
 496. Describe its calyx.
 497. Describe the corolla.

We have, at Fig. 70, a representation of the Mountain Daisy, we will now consider the appearance of its different parts.

493. 1. The *Root, a*; you will observe this answers to the description of *fibrous*, as small thread-like parts issue from the main root, or *radix*.

494. 2. The *Leaves, b*; these, you observe, spring from the root, and are hence called *radical*; being undivided, they are called *simple*. In form they are somewhat *ovate*, with the narrow end towards the stem; this form is called *obovate*. The leaves are said to be *crenate*, on account of their scolloped margins.

are *tubular* (Fig. 71, *a*); they have both stamens and pistils; they are funnel-shaped, and five toothed; the florets of the ray Fig. 71, *b*, are flat, and have pistils without stamens.



498. 6. The *Stamens, c*, are *five*, united by their anthers, forming a tube.

499. 7. The *pistil*, in the disk florets, through the tube formed by the anthers, *d*; the stigma is parted into two divisions which are *reflexed* (bent back); the pistil in the ray through the tube of the floret.

500. 8. The Daisy has no *pericarp*, or seed vessel, the seeds grow upon the receptacle, *e*, they are single and shaped somewhat like an egg; they are also naked, that is, destitute of the downy plume called *egret*, which is seen upon the dandelion, and many other of the syngenesious plants.

501. 9. The *receptacle* is *conical*, or in shape resembles a sugar-loaf. It is dotted with little holes: these are the places in which the seeds were fixed. The appearance of the receptacle, whether naked or chaffy, is very important to be observed in the syngenesious plants; it sometimes constitutes a distinction between genera.

502. The botanical name of the daisy is *BELLIS perennis*. It belongs to class 17th, Syngenesia, because the anthers are united; order 2d, Superflua, because the pistils in the ray are superfluous, or have no stamens. The generic name *Bellis*, is perhaps from the Latin word *bellus*, handsome; the specific name, *perennis*, signifies that it is a perennial plant, or one whose roots live several years.

503. The common name, *daisy*, is derived from a property which many of the syngenesious plants possess, of folding up their petals at the setting of the sun, and expanding them with its rising. The poet Chaucer, who lived in the fourteenth century, is said to have first noticed this circumstance, and to have

498. Describe its stamens.
 499. How is the pistil situated?
 500. Where do the seeds grow?
 501. Describe the receptacle of the daisy.
 502. What is the botanical name and classification of the daisy?
 503. Why was this flower called daisy?

called the flower Day's-eye. The French name for the daisy is *la belle Marguerite*.

CHAPTER XX.

Class 1st—Class 2nd.

504. You have now been made acquainted with many important principles in the science of Botany. You were first taught the names of the different parts of a flower; then how to find to what class, order, genera, and species, some particular plants belonged; and after that, all the classes and orders were explained. We then took up the subject of plants generally, and considered them as respects their various organs, as the root, stem, leaf, &c.; this part of the study is often called *elementary Botany*, while the study of classes and orders is called *systematic Botany*.

505. The different families of plants, as they seem distinguished by nature, were next considered. It is to be hoped that you now understand clearly the difference between *natural families*, and *artificial classes*; viz. that the former, such as the families of lilies, roses, &c. are distinguished by characters which may be noticed by all observers; while the latter are founded upon circumstances which botanists have agreed to found their classifications upon.

506. In pursuing the study of Botany, it is necessary that you should have a great deal of practice, in the systematic part; that is, that you should analyze many plants, and be careful to collect and examine flowers. We shall now consider some of the classes and orders in a more particular manner, and give examples of plants which belong to them.

504. What is said of the different principles which you have now been made acquainted with?

505. What do you understand to be the difference between *Natural Families* and *Artificial Classes*?

506. What is said of *practice* in Botany?

CLASS I.—MONANDRIA.* One stamen.

It contains two orders.

507. The first order of the first class is *Monogynia*, or one pistil. There are few plants in this class; the genus *Hippuris*, or mare's tail, which grows in water and marshes, and is therefore aquatic, belongs here. It is considered a perfect flower, because it has a stamen and pistil, though it has neither calyx nor corolla.

Fig. 72.



508. Look at Fig. 72, and you will see at *a*, that the stem is *erect* and *simple*; the leaves *linear*, *acute*, and growing in *whorls*.

At *b*, is a representation of a flower of this plant as seen through a microscope; the germ is *egg-shaped*; the style is long and *awl-shaped*; the stigma is small and pointed; the anther is large, and connected to the germ by a short filament.

You must study the explanations and look at the figure until you can tell the different parts as represented.

509. Southern countries have some very valuable plants of this class; as the Arrow-root, which, when made into gruel, is nourishing to the sick; persons have sometimes lived for weeks upon this; it has been found very beneficial for feeble children who could not bear milk. This substance looks like starch, and is prepared by wetting it first with a little cold water, and then pouring upon it boiling water in the same manner as for making starch.

510. The Ginger is botanically called *Zinziber*, a name

* Here the pupil can consult pages 24 and 25, where he will find that *Monos* is the Greek for *one*, and *andria* for *stamen*; therefore the 1st class is called *Monandria*, because it has one stamen. For an explanation of the names of the orders, he must look to Chap. V. It is recommended to the teacher to examine the pupil closely upon the classes and orders, and especially the derivation of the terms by which they are designated.

507. What is said of the 1st order of the class *Monandria*?

508. What does Fig. 72 represent?

509. What is said of the Arrow-root?

510. What is said of Ginger?

which is said to be of Indian origin, the plant being a native of the West Indies. It is placed in the class and order we are now considering, because it has but one stamen and one pistil. Its flowers are beautiful, and highly odoriferous. It is the root of this plant which affords the ginger powder, so much used in making gingerbread, beer, &c. The roots are first dried, then ground; but impositions are often practised by mixing some less valuable substance with the ground ginger. It is therefore best to buy it in the root. The fresh root of ginger is made into sweetmeats in the West Indies; these are often brought to the United States, and kept by nice housekeepers in order to add a flavour to other preserves.

511. ORDER 2. DIGYNIA; this has one stamen, and two pistils. We here find *Blitum*; it has no corolla. Look at Fig. 72, at *c* you will find a representation of this flower; its calyx is deeply three parted; the germ resembles a berry, and is crowned by the two reflexed styles.

CLASS II. DIANDRIA. *Two stamens.*

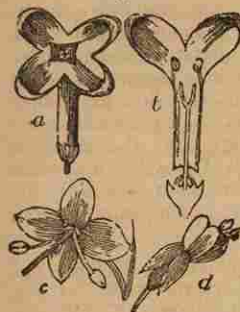
Order Monogynia, one pistil.

512. For an example in this class and order, you have here a representation of the blossom of the Lilac, of which the scientific name is *Syringa*, said to be derived from a Turkish word signifying pipe, the stems of pipes being sometimes made of the roots of the plant.

511. What is the name of the 2d order, and what plant is described under it?

512. What plant is spoken of under the 1st order of the class Diandria?

Fig. 73.



513. Fig. 73, at *a*, shows a flower of the lilac; the corolla is *salver form* having a flat four-parted border, spreading from a tube. You might at first suppose the lilac to consist of four petals; but if you should, in a real flower, attempt to separate them, you would find the whole united, and that it is monopetalous. In flowers of one petal, the stamens are generally fastened to the corolla; where there are several petals, the stamens are usually attached to the receptacle. At *b* the lilac is represented as if cut lengthwise, to show the two stamens standing opposite to each other, and attached to the corolla.

514. The flowers of the lilac are crowded together in that form of inflorescence which is called a *thyrs*e. This flower, although so common, is an exotic. There are two species, which are frequently to be met with in this country; the most common is the *vulgaris*, which has broad heart-shaped leaves; the *persica*, or Persian, has lanceolate leaves. The word *lilac* is derived from the Persian, and signifies a flower. These plants are shrubs, and distinguished by large showy thyrses of fragrant purple or white flowers.

515. The *Veronica*, or Speedwell, is found in America, though there are here but a few species of it, compared to those of Europe. It has a wheel-shaped corolla, deeply four-cleft, with the lower part somewhat smaller than the others, as may be seen at Fig. 73, *c*; the two stamens and the pistil may be seen in the picture. The *beccabunga* is one of the most common American species of this genus; it is found on the borders of brooks and in ditches. The petals are blue, but very soon turn black; yet although this plant does not make a handsome appearance in an herbarium, it is desirable to obtain it, as there are so few specimens of this class and order. One species of this genus, the *alpina*, is common to the Highlands of Scotland; another species is found only upon the Cheviot Hills between England and Scotland. Various species of it abound in Wales and other parts of Great Britain.

516. The *Circaea* is represented at Fig. 73, *d*; the calyx

513. What does Fig. 73 represent?

514. What farther is said of the lilac?

515. Describe the *Veronica*.

516. Describe the *Circaea*.

morosvalous, or has but one leaf, it is divided into two parts, which are *reflexed*; the corolla has two petals; the germ is below the calyx. This is a very small perennial plant which grows in shady places; its blossom is white, and remarkable for the symmetry of its parts, having *two* stamens, *two* petals, a calyx with *two* divisions; a capsule with *two* cells, each of which contains *two* seeds. Its common name is Enchanter's night shade; this plant is common about the shores of the Cumberland lakes in England, and the Highland glens of Scotland, as well as in the United States.

517. The *Olca*, or olive, is said to derive its scientific name from a Latin word signifying oil. This plant is an evergreen tree which grows to the height of twenty or thirty feet; it is common on the rocks of Palestine, and travellers say it is still found upon the spot called the Mount of Olives. It is possible that the very tree which once afforded shade to our Saviour may be still living, since there is reason to believe that there are trees now in existence, of which Pliny, who lived near the time of Christ, makes mention.

518. ORDER 2. DIGYNIA; *two* pistils. To illustrate this order we shall mention the *Anthoxanthum*, or sweet-scented spring-grass; this blossoms in May, and when drying, diffuses the pleasant and refreshing smell peculiar to new mown hay. This plant is not classed with the other grasses, which are most in the third class, because it has but two stamens.

519. ORDER 3d. TRIGYNIA, *three* pistils. We here find the genus *Piper*, the name of which is derived from the Hindoo word *pippul*. It is a climbing plant which is supported upon poles; thus the pepper plantations of the East Indies bear a resemblance to the hop fields of New England. The *Piper Nigrum*, or black pepper, is that species which is most used in commerce, and which furnishes the spice daily used upon our tables. Black pepper was known in commerce in the most remote ages. The Greeks and Romans obtained it from Asia. It has been introduced into the hot region of America; where it grows as well as in its native country.

520. Another species of pepper is the *betel*; the leaves of this plant are used in the East Indies, to enclose slices of a palm nut called the *areca* nut, thus prepared for the purpose of chewing; the natives of that country esteem it a great luxury

517. Describe the Olive.
518. What plant is described under the 2d order?
519. What is described under the 3d order?
520. Of what genus is the betel nut?

using it as Americans do tobacco. Those who have read the *Lady of the Manor*, *Stories on the Church Catechism*, and other works of Mrs. Sherwood, as well as those of other writers on the manners and customs of the people of India, will recollect the *betel nut*.

CHAPTER XXI.

Class 3d—Class 4th.

CLASS III.—TRIANDRIA, *three* stamens.Order 1st, *Monogynia*, *one* pistil.

Fig. 74.



521. This picture represents *two* flowers of this class and order. *A* is a flower of the genus *Ixia*, (from the Greek *ixios*, blue,) the common name of which is blackberry-lily, though the blackberry-lily common in our gardens is of an orange colour; at *b* is the same flower cut lengthwise to show the three stamens; this is not a liliaceous flower, notwithstanding its common name, as such flowers have six stamens. Fig. 74, at *c*, represents the *Nardus*, or mat-grass; this flower differs from those of the common grasses in having but one pistil.

522. The *Crocus* is among our earliest garden flowers; its name is derived from ancient Mythology, which pretended that a youth of that name was transformed into this plant.

523. The species of crocus called *vernus* (a name which signifies spring) sometimes appears as early as March, and often springs up amidst surrounding snow banks; it is of various colours, purple, straw coloured, yellow, and variegated. This is a bulbous plant, with linear leaves, a spatha calyx, and a corolla of six petals.

524. One species of the *Crocus*, the *autumnalis*, blossoms late in autumn; the large yellow stigmas, furnish the true saffron which is sold by druggists. The plant commonly known among us as the saffron, is a compound flower, and belongs to

521. What does Fig. 74 represent?
522. What is said of the *Crocus* with respect to the derivation of its name?
523. Describe the *Crocus vernus*.
524. Describe the *Crocus autumnalis*.

the class Syngenesia; it is the fine yellow petals of the latter which produce the colour used in dyeing; these possess medicinal properties.

525. The *Iris*, is one of the most common of our garden plants; several species are found in meadows and damp grounds. The common name is *flower de luce*, which is a corruption of the French *fleur de lis*, or flower of the lily.

526. This was formerly the national emblem of France, as the rose was of England. It was adopted in 1179 by Louis VII; after this, some kings of the house of Bourbon began to use upon their seals and coat of arms, three of these flowers.

527. When, on the fall of the Bourbon family, Napoleon became emperor of the French, he adopted the *Roman Eagle* for his emblem. The standard for his army was a gilt-eagle elevated upon a long staff; it appeared seated, and with its wings folded, according to the Roman manner of representing this bold and resolute bird. The American Eagle stands, with outspread wings, as if still soaring aloft, and protecting the striped banner which is below him.

528. After the ruin of Napoleon, and the restoration of the Bourbon family to the throne of France, the eagle was put down, and the *fleur de lis*, or *Iris*, restored to its ancient honours; the friends of the restored Bourbons were every where seen with this flower in the button-hole of the coat.

529. When in 1830, a new revolution drove from France its Bourbon king, Charles X, the *fleur de lis* was again in disgrace, and palaces and public works adorned with this emblem were destroyed without mercy. Some have supposed that the white lily is the national flower of the French, but it is undoubtedly the white *Iris* which is thus distinguished.

530. You will find the *Iris* a curious and interesting plant to analyze, which, after what you have now learned respecting the plant, I hope you will feel induced to attempt. The name *Iris* is so called from *iris*, the rain bow, on account of the variety of colours which this flower reflects. Purple, blue, orange, yellow, and white, are often seen shading into one another in some species. The most common *Iris* is that which is found in marshes, and known by the name of *Blue flag*, and sometimes *Poison flag*.

525. Give an account of the *Iris*.

526. Who adopted this flower as a national emblem?

527. When was the *Roman Eagle* substituted for the *Fleur de lis*?

528. When was the *Iris* restored to its ancient honours?

529. How was the *fleur de lis* regarded after the revolution of 1830?

530. Why is the *Iris* so called?

531. ORDER 2 DIGYNIA, *two pistils*. We here find the important family of grasses, of which there are many different genera. They are distributed throughout the globe, and furnish many of the most useful vegetables for man and beast.

532. Among the most useful of the grass family, are wheat, rye, barley, oats, Indian corn, and rice, besides meadow-grass and those kinds which are eaten by cattle.

533. Indian corn, though it is ranked with the grasses on account of its long and linear leaves, its fibrous roots, and some other particulars, yet it is not placed in the third class, because its stamens and pistils are not in the same flower. Rice is placed in the sixth class on account of the number of its stamens. You see that natural families are sometimes separated by the artificial classification; as in the second class two grasses were mentioned, which were placed there on account of having two stamens.

534. Grasses have fibrous roots, their stems are of that kind called *culms*, being long, slender, and hollow, and having knots from which arises a long *linear* or *lanceolate* leaf surrounding the stem like a sheath.

535. The stems of grasses grow internally, or from the centre outwards; this is the reverse of what appears in the oak, the new wood of which encircles the old.

536. The flowers of the grasses are found in what is called the ear or head; and consist of a calyx of two green husks called a *glume*; within this calyx is the blossom, consisting of a husk of two pieces; these husks are the chaff, which is separated from the seed by threshing. If you observe a blossom of wheat, or of common meadow grass, you will see three stamens with large anthers, and two pistils with feathered stigmas.

537. The grasses have no seed vessel, but the seed is contained within the husks, which gradually open and throw out their contents; this scattering of the seed is the cause of the very general distribution of grasses.

538. Wheat, rye, and oats, are *annual* plants; that is, their roots die every year, and the plant is renewed by means of the

531. What important family do we find in the 2d order of the class Triandria?

532. Which are some of the most useful of the grass family?

533. Why are not Indian-corn and Rice classed with the grasses?

534. What is said of the roots of grasses?

535. What of their stems?

536. What of their flowers?

537. Have the grasses a seed vessel?

538. What grasses are annual, and what are perennial?

seed. The grasses which serve for the subsistence of cattle are mostly *perennial*; though the herbage dies at the approach of winter, the roots live, and are ready to throw out their shoots on the return of spring.

539. Grasses are not recommended for young botanists to analyze, because it is often difficult to distinguish the different genera, as they appear in many respects very similar, and the flowers are not showy like those of many other plants; however, you can easily distinguish the different parts of a bunch of grass, viz.: the fibrous root, the culm-like stem, the long and narrow leaves, and the flowers with their green stamens and pistils.

540. There are some coarse grass-like plants, which grow in bogs and marshes, destitute of those nourishing qualities which belong to the grasses generally; they are known by the name of rushes, sedges, and cat-tails: most of them have their stamens and pistils on separate flowers, and are therefore placed in the class *Monœcia*.

CLASS IV.—TETRANDRIA, four stamens.

541. ORDER 1, MONOGYNIA, one pistil. This class presents us with flowers of *four stamens* of nearly *equal length*;—there is another class, the 13th, in which the plants have four stamens, but these grow in *two pairs of unequal length*.

Fig. 75.



542. The cut represents at *a* the stamens, pistils, and four leaved calyx, of the common plain-tain; at *b*, those of the *Cornus*, or Box-wood; at *c*, is a flower of the *Cissus*, or false grape, its calyx is very small, (not seen in the cut,) the petals are large and bent back, the filaments are shorter than the petals and crowned with large anthers.

543. There is a little pale blue flower which almost every child in New England knows and loves. It is known by different names; some call

539. Are grasses the best flowers for beginners in botany to analyze?

540. What is said of the grass-like plants which grow in bogs and marshes?

541. How does the 4th class differ from the 13th?

542. What does Fig. 75 represent?

it *Innocence*, of which it is no unapt emblem, others term it *Forget-me-not*; but as the latter name is appropriated to several other flowers, I would recommend the former. This little flower rises but a few inches from the ground; it is surrounded by tufts of leaves clustered around the root; it grows in great luxuriance upon sloping banks, dotting the meadows and sides of rivulets; often appearing in large patches, which form a soft and fragrant bed; it invites the child weary of play to repose on its flowery turf, and thus it becomes associated with recollections of the playful and happy innocence of early days.

544. A lady of New England, who learned Botany at a distance from the scenes of her childhood, though she found a great many splendid and beautiful flowers to examine by the aid of her favourite study, was very anxious to meet with the little pale blue meadow-flower which had flourished in such luxuriance around the home of her infancy; she examined books to find drawings or descriptions of it, and searched the fields for living specimens, but none seemed to answer to the picture in her mind, and she at length gave up the little flower, as a thing of mere fancy, which had mingled with the indistinct recollections of early days. But on returning to her native place, as she was riding out one fine day in spring, a mossy bank appeared to her delighted eye, bespangled with the flower of *Innocence*, and presenting the very image she had so often driven from her mind as a creation of fancy. She alighted, and after feasting her eyes on the sight once so familiar, and enjoying the freshness of the flowery turf, she carefully placed in a book some tufts of the little plant, and on going home, sought out its name and place in botanical arrangement.

545. The lady saw that it had four stamens of nearly equal length, and one pistil, and that it must therefore be described under the fourth class, first order; the little calyx was four cleft, it supported a corolla having a small tube, and spreading into a flat border with four petal like divisions, which resembled a cross. The little leaves were *ovate* and *radical*; and the stem spread out into small branches, bearing upon them the flowers. Then the lady by examining the different descriptions of plants in this class and order, found that her little favourite was known by botanists by the name of *HOUSTONIA CERULEA*,* the generic name being derived from Houston, the person who first describ-

* Pronounced *cerulea*.

543. What is said of the flower called *Innocence*?

544. What is said of a lady who wished to meet with this little flower after she had studied Botany?

ed it, and the *specific* name signifying blue, being the Latin term for that colour.

I should like to tell you more about the flowers of this class, but as you proceed in your analysis of plants, you will find many pretty wild-flowers which belong here, as well as some splendid green-house plants.

CHAPTER XXII.

Class 5th—Class 6th.

CLASS V. PENTANDRIA, five stamens.

Order 1. Monogynia, one pistil.

546. The fifth class is said to include about a tenth part of all known species of plants. The flowers of this class have five separate stamens, while those of the class Syngenesia have five stamens whose anthers are united.

Fig. 76.



547. Fig. 76. shows you, at *a*, a flower called Loose-strife; this in Botany is known by the generic name *Lysimachia*, which is derived from *Lysimachus*, the discoverer of the medical virtues of an ancient plant so named. You may find several different species of this plant in June and July by the sides of brooks and in low meadow-grounds. The flowers are wheel-form, and generally yellow.

At *b*, (Fig. 76.) is a picture of the blossom of the trumpet honeysuckle, called *Lonicera*, from *Lonicer*, a botanist of the 16th century. This flower has a very small five-cleft calyx, which is superior or above the germ; the corolla is *monopetalous*, and *tubular*; the tube is *oblong*, the *limb* of the corolla is deeply divided into five *revolute* parts or segments, one of which is separated from the others; the filaments are *exserted*, the anthers *oblong*.

545. In what class and order did the lady find the flower of Innocence, and what is its botanical name?

546. What is said of the plants of the fifth class?

547. What does Fig. 76 represent?

548. In the fifth class are to be found some large natural families of plants; of these I shall mention the *Asperifoliæ*, from the Latin words *asper*, rough, and *folium*, a leaf, signifying rough-leaved plants. In this family are many different genera, all of which have hairy or rough leaves; the *Cynoglossum* is so called from the Greek *kuon*, a dog, and *glossa*, tongue, the broad oval leaves being thought to resemble a dog's tongue. The common name of the plant is Hound's-tongue. Although this is considered as belonging to the family of rough leaved plants, the hairs of its leaves are soft and downy, like the surface of velvet; it is about two feet high, having *panicles* of reddish purple flowers. You must not fail to collect specimens of this plant to analyze; it is in blossom about the middle of summer, growing by the sides of fences or near roads, and about old buildings.

549. There is a large family of plants in this class, called the *Luridæ*, from *lurid*, signifying pale or livid, as this is the general appearance of the plant. In this natural assemblage is the Potato, the blossoms of which you will do well to examine; the little green balls which grow from the flowers are the pericarps and contain the seed; but the plant is generally produced from the root.

550. The botanical name of the genus in which the potato is found is *Solanum*, from *solor*, to comfort; because some species in the same genus possess narcotic qualities. You would not expect to find in the same genus with the potato, plants which are highly poisonous, and yet here is the night-shade (*Solanum dulcamara*) whose berries are so injurious to life, that thirty of them once given to a dog, first drove him mad, and then caused his death, in less than three hours. Children should be very careful not to touch these berries, which are red, and might easily be mistaken for currants, especially as they grow by hedges, where such fruit is often found. It is always unsafe to eat any vegetable production, which is not well known and familiar.

551. In the genus *Solanum*, are the Tomata, or love apple, and the Egg-plant, which in southern countries are much used in soups and sauces. In our climate, although they may be easily cultivated, they do not appear to attain that richness and perfection which is common in southern latitudes.

552. But the most valuable plant in the genus *Solanum* is

548. What is said of the family called *Asperifoliæ*, and of the genus *Cynoglossum*?

549. What is said of the family called *Luridæ*?

550. What is said of the genus which contains the potato?

551. What is said of the Tomata and Egg-plant?

552. What is the most valuable species in the genus *Solanum*?

the *tuberosum*, so called from its *tuberos* root; this is our common Potato; it was at first obtained from Peru, where it was called *batatas*. Of the important use now made of the root of this vegetable, it is unnecessary to remark; as an article of food it is scarcely less valuable than bread itself, and indeed is often used by poor people as a substitute for this article.

553. In the large family *Luridæ*, or *lurid* plants, is the genus *Nicotiana*, so called from Nicot, who carried it from America to Europe; one species of this, *Tabaccum*, is the Tobacco plant. Here also is found the *Datura Stramonium*, sometimes called thorn apple, a large, nauseous-scented weed, with angular, dentate leaves. The corolla is funnel-form and five-cleft; the pericarp is ovate and spinose; at the base is a portion of the calyx which remains permanent, while the other parts are deciduous. In the spring of 1835, a young lady of Vernon, in Vermont, while amusing herself with a walk in the fields, saw some of the last year's pericarps of the *Stramonium*, and carelessly ate a small quantity of the seeds. She was soon seized with spasms, and died after a few hours of excruciating agony. Had she understood Botany, she might have known, from the general appearance of the plant, that it was of a poisonous nature.

554. Among the many plants of the fifth class and first order, you will find the mullein, which every child knows by its large woolly leaf, and its high stalk, bearing yellow blossoms in that form which is called a *spike*. Violets you will find from the earliest days of spring to the verge of winter. In the fields are white, blue, and yellow violets, and in gardens is the heart's ease, or tri-coloured violet. The grape belongs to this class and order; the fruit of the plant is probably more familiar to you than the flower, which is small and inconspicuous.

555. In some species of the grape, the stamens and pistils are on different flowers; and for this reason this plant has sometimes been placed in the class *Diœcia*; but as other species have five stamens and one pistil in the same flower it is generally thought best to class the whole under *Pentandria*.

553. What other genus is mentioned as belonging to the family called *Luridæ*?

554. What other plants are mentioned as belonging to this class and order?

555. Why is the grape sometimes placed in the class *Diœcia*?

556. ORDER 2, *DIÏGYNIA*, *two pistils*. In this order of the fifth class is a very large natural family of plants, called *Umbelliferous*, or *umbellate*, from the manner of their inflorescence, which is in the form of an *umbel*, or umbrella, as you can see in Dill, Fennel, or Carroway.

557. Plants with umbels are to be found every where in summer; such as are poisonous grow in low, wet ground, as the Poison-hemlock, Cowbane, &c. Some useful table vegetables belong to this family, as Celery, Parsnips, &c. Some of these plants produce seeds useful in medicine and confectionary, as Anise and Coriander.

558. ORDER 3, *TRIGYNIA*, *three pistils*. You will find here the Elder, a shrub with delicate, white flowers, growing in clusters called *cymes*; children very early learn to know this plant, not only by its flowers, but by its dark red berries, with which they sometimes mischievously stain their clothes and faces. The Snow-ball is a very showy, handsome, and ornamental shrub; there is a wild plant which is common in the woods, that is not less beautiful than this; it is a species of the same genus *Viburnum*, and is well worth being transplanted to cultivated grounds.

559. ORDER 5, *PENTAGYNIA*, *five pistils*. The flax is found here. Its botanical name is *linum*, so called from a Celtic word, *lin*, a thread. The blossom of the flax is very pretty; its colour is pale blue, and it stands upon a straight, erect stalk. This is one of the most valuable of the vegetable productions.

There are other orders in the fifth class, but we cannot now stop to consider them; when you have learned what this book contains, your kind parents will be willing to furnish you with the larger volume to which this is an introduction: * in that you will find a great many interesting facts with respect to plants, that could not be mentioned in so small a book as this

CLASS VI.—*HEXANDRIA*, *six stamens*.

560. ORDER 1, *MONOGYNIA*, *one pistil*. In this class are a great many beautiful exotics; most of which are distinguish

* Familiar Lectures on Botany.

556. What large family of plants do we meet with in the second order of the sixth class?

557. Are these plants common?

558. What plants are mentioned in the 3d order of the class *Pentandria*?

559. Describe the Flax.

560. What is said of some of the plants of the 6th class?

ed by having *bulbous* roots, seeds with but *one cotyledon*, and stems which grow from the centre outwardly, and are therefore called *endogenous*.

Fig. 77.



561. Fig. 77, represents a flower of the sixth class and first order, called by the ancients *Asphodel*; it was considered by them as sacred to the dead, and made to grow around the tombs.

562. We find in this class and order the family of liliaceous plants, including the various kinds of lilies, tulips, crown-imperial, &c. You have already been made acquainted with the characteristics of these plants.

563. The Lily is in Botany called *Lilium*; this genus consists of many species. The white Lily (*Lilium candidum*) is perhaps more admired than any other species; its fragrance is very agreeable, and its corolla of a pure and brilliant whiteness. There are several besides the garden lilies which are much valued by florists. You may find in July and August, growing in meadows, two or three wild lilies; one has large orange flowers spotted with yellow and brown, and another with yellow flowers.

564. I will here tell you the distinction between a florist and botanist—the former cultivates flowers for their beauty, and may know nothing of their scientific arrangement; the latter examines them with reference to their various scientific characters, and is often as much delighted with finding a little, obscure, wild flower, as the florist is when he meets with some splendid exotic. It is very strange that all florists should not wish to be botanists.

565. Tulips are usually great favourites with florists, who delight in producing *varieties* in their colours by different modes of cultivation, and also in obtaining double flowers by a peculiar method of culture. Although the petals of the tulip in its natural state are but six, yet by care in its cultivation, it may, like the rose, be brought to produce many petals.

566. In this class and order are some tropical plants, whose fruits are very valuable in their native regions,—the Genus

561. What does Fig. 77 represent?
 562. What plants belong to the family of Liliaceous plants?
 563. What is said of the Lily?
 564. What is the difference between a florist and a botanist?
 565. What flower is a great favourite with florists?
 566. What is said of the Plantain tree?

Musa, affords the Plantain and Banana trees, whose leaves and fruit are of great size. The Plantain trees grow to the height of twenty feet, having leaves about six feet long and two broad. Some of these trees in a plantation will not fail to be in bearing at every season of the year, so that the inhabitants of the countries which produce them are in no danger of perishing for want of food. The fruit when used as bread is roasted or boiled; it is also made into pies, or dried and preserved as a sweet meat. Three dozen of plantains are considered as sufficient food for a man during a week, and it is said will support him better than bread.

567. The fruit of the Banana is not unlike the cucumber in form and size; when ripe it is soft and pleasant to the taste. It is introduced at desserts at the tables of the rich in the West Indies; and is much used as an article of food among the poorer classes of people. How kind, my dear children, is Providence, in thus causing the earth to bring forth cooling and nourishing fruits and refreshing shades in those parched and burning countries!

568. The Aloe belongs to the class and order we are considering; there are a great many species of it; some grow but a few inches high, and others to the height of tall trees. The Aloe is a native of hot countries. The Negroes of the Western coast of Africa, make nets of the fibrous parts of the leaves of this plant; the Hottentots use the stem for their arrows. The people of Jamaica obtain materials from the Aloe plant from which they make fishing nets, stockings, and thread. In Mexico, a species of aloe serves for hedges, enclosures, beams for the roofs of houses, and leaves for their covering: its wood and fibres furnish needles and thread, cloth and ropes, while its juices afford sugar and vinegar. The juice of aloes was used among Eastern nations in embalming their dead. This plant is often spoken of in the Bible, particularly in the Old Testament. It is very useful in medicine; for which purpose it is prepared by pressing from its leaves a gummy substance of an extremely bitter taste, from whence comes the very common comparison, "as bitter as aloes." The Island of Socotra was the first place where this gum was prepared; hence it was called *Socotrine aloes*, a name which is still in use. Many plants of this genus produce beautiful flowers; some are said not to blossom until they are 100 years old.

It is necessary to pass over many interesting plants which

567. What is said of the fruit of the Banana?
 568. Repeat what is said of the Aloe plant.

we might name here, as the Lily of the Valley, Hyacinth, Scotch hare-bell, &c

569. ORDER DIGYNIA, *two pistils*. We find here the genus *Oryza* which contains the Rice; this is a grass-like plant, but, on account of its six stamens and two pistils, is not placed in the same class with most of the grasses. This is a southern production, and one of great importance; giving food to a great portion of the inhabitants of hot countries.

ALERE FLAMMAM
VERITATIS
CHAPTER XXIII.

Class 7th—Class 8th—Class 9th—Class 10th—Class 11th—
Class 12th.

CLASS VII. HEPTANDRIA, *seven stamens*.

Order 1. MONOGYNIA, *one pistil*.

Fig. 78.



570. This picture shows a blossom of the Horse-Chestnut, a plant which was introduced from Asia into Europe in the year 1500. It is a small tree, which produces showy panicles of white and red flowers crowded together in the form of a pyramid.—The botanical name of this plant is *Aesculus*, from *esca*, food; probably from a mistaken idea that its nut might prove valuable as such. The species of *Aesculus* most common with us, is the *hippocastanum*, which signifies horse-chestnut, being derived from the Greek words of that signification.

571. There are three other orders of the seventh class, but none contain plants which you will be likely to meet with, or which are much celebrated. Belonging to this class and order there is a very small plant, called chickweed winter green, or *Trientalis*; you may find it in woods about the roots of trees in May and June; the small white flowers are stellate, and or

569. What plant is mentioned in the 2d order of the class Hexan-
*12?

570. Describe the Horse-chestnut.
571. What is said of the *Trientalis*?

slender peduncles, the leaves are six or seven in a terminal whorl.

CLASS VIII. OCTANDRIA, *eight stamens*.

ORDER 1. MONOGYNIA, *one pistil*.

Fig. 79.



572. This picture shows you a blossom of the Lady's ear-drop, a very beautiful exotic, whose generic name is *Fuchsia*, so called from *Fusch*, a German who discovered it. The part which you would think is the corolla, is the calyx, this is of a beautiful crimson colour; the petals are purple and rolled around the stamens beneath the calyx.

573. As an example of the eighth class, almost every garden will afford you the Nasturtion, which was originally brought from South America. In examining this plant, you will perceive it has not that regularity of parts which is found in many. It has eight stamens, while the number of its petals is neither four nor eight, but five. The fruit consists of three seeds. The leaf is of a *pellate* form

CLASS IX. ENNEANDRIA, *nine stamens*.

ORDER 1. MONOGYNIA, *one pistil*.

Fig. 80.



574. The picture presents at *a*, the *Butomus umbellatus*, or Flowering rush; it has no calyx; its petals are six, and egg-shaped stamens nine; its germs are six, and therefore by some botanists it is placed in the sixth order. This plant blossoms in June, and is usually found near the margins of small lakes and ponds, or in ditches and low wet grounds; it has umbels of pretty rose-coloured flowers. It is spoken of by European botanists as common among them; but it is not known to be a native of the United States.

575. The genus *Laurus* belongs to the first order of the ninth

572. Describe the Lady's ear-drop.

573. What is said of the Nasturtion?

574. What is said of the *Butomus umbellatus*?

575. What is said of the genus *Laurus*? What of the *Laurus No-*
bilis?

class; the name may be derived from the ancient Celtic, which signifies green, the leaves of this plant being mostly perennial and evergreen; some suppose it derived from *laus*, praise, as it was used for crowning victors or poets.

One species, the *Laurus nobilis*, or noble laurel, is the Bay of the ancient Romans. They considered it as a peculiar favourite of Jupiter the thunderer, and some wore it as a protection against his thunderbolts. But this, you know, was a ridiculous superstition, like many other notions of the believers in the Grecian mythology, since there is but one living and true God, and to Him all the vegetable creation is equally dear; He has made plants for the support of man and beast, and for the beautifying and refreshing of the earth on which we live—that we should love and cherish these His gifts, is undoubtedly agreeable to him; but if we deserve his frowns, no bough of a plant, nor even the rocks or mountains, can shield us from the effects of His anger—But it was before men had learnt from the Bible to worship one God only, that they thus fell into such foolish errors with respect to the Powers in Heaven; none in Christian countries now adhere to the superstition of the ancients, although there are some who are worse than the heathen, by refusing to believe, although God has revealed himself to men through His Son, who sealed with his own blood the message delivered to them.

576. The *Laurus* is an important plant: for besides the honour and superstitious regard bestowed upon it by the ancients, it now affords us very important medicines, as well as some of our most valuable spices.

577. The *Laurus Camphor* is the camphor tree. Camphor is obtained from its roots, leaves, and wood.

The *Laurus Cinamomum* is the cinamon tree, whose inner bark or *liber* furnishes this valuable spice.

The *Laurus sassafras* is the American sassafras tree.—Children are fond of the bark of this plant, which is sometimes improperly called *saxifax*.

578. The third order of the ninth class contains the genus *Rheum*, or the Rhubarb. Fig. 80, at *b*, represents a flower of this genus. The *Rheum palmatum* furnishes the medicinal rhubarb, which is obtained from its thick, yellow roots. The *Rheum tartaricum*, or sour rhubarb, is much cultivated in gardens, and is a useful plant for tarts, which are made from its large, thick, and juicy petioles.

576. Why is the *Laurus* an important plant?

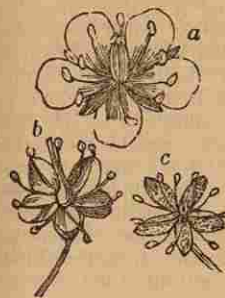
577. Which are some of the species of the genus *Laurus*?

578. What plant is mentioned as belonging to the third order of the ninth class?

CLASS X. DECANDRIA, ten stamens

ORDER 1. MONOGYNIA, one pistil.

Fig. 81.



579. This cut represents at *a*, a flower of the genus *Ruta*, (*rut*); its calyx is *monosepalous*; it has five petals; the germ is large and *superior*.

At *b* is a flower of the *Saxifraga*; one species of this, sometimes called beef-steak geranium, is a very common and hardy green-house plant, with creeping roots and roundish hairy leaves.

At *c* is a flower of the genus *Ledum*; this corresponds with the *Saxifraga* in the number of its petals; it is in some parts of Europe valued as a medicinal plant.

580. In the tenth class, are to be found the wintergreen and the whortleberry; which are well known to children; the former for its pleasant tasted leaves, and fine red berries, and the latter for its fruit. You must seek for these flowers, they are, very pretty, and easy to analyze.

581. This class has several orders; the second order contains the pink and some other interesting flowers. The tenth order has the poke-weed, a high plant, which you find so common by the waysides, with long, broad leaves, and purple berries.

579. What does Fig. 81 at *a* represent?

580. What is said of the wintergreen and whortleberry?

581. What is said of the other orders of this class?

CLASS XI. ICOSANDRIA, more than ten stamens inserted on the calyx.

ORDER I. MONOGYNIA, one pistil.

Fig. 82.



582. In this class, the number of stamens is not regarded, so much as their situation. If you remember what was said about the rose in the 4th chapter, you will understand what is the essential character of this class. The rose, however, does not belong to the first order.

583. In this order we find a genus called *Cactus*, one of the species of which is the Prickly-pear. This contains many species; a very splendid one is the Night-blooming *Cereus*, (*Cactus grandiflorus*,) having flowers nearly a foot in diameter, with the calyx yellow, and the petals white; the flowers begin to open soon after the setting of the sun, and close before its rising, never again to blossom. Another species, (*speciosissimus*,) with flowers of the colour of crimson velvet, is said to be still more superb than the *grandiflorus*. These plants are mostly destitute of leaves, but the stems appear like a series of thick, fleshy leaves, one growing from the top of another.

584. *Prunus* is the genus which contains the various kinds of the Plum, Cherry, and Sloe; this genus, according to ancient writers, was brought from Syria into Greece, and from thence into Italy. The Roman poets often notice its fruit. We have several native species of it.

585. The Pomegranate is a shrubby tree, which is a native of Spain, Italy, and Barbary, and flowers from June till September. The Greek writers were acquainted with it, and we are told by Pliny, that its fruit was sold in the neighbourhood of Carthage. It is cultivated in England and in the United States; not on account of its fruit, which does not come to perfection so far to the north, but for its large and beautiful scarlet flowers, which render it an ornamental plant.

582. What circumstance is more regarded in the class Icosandria than the number of stamens?

583. What is said of the genus *Cactus*?

584. What is said of the genus *Prunus*?

585. Of the Pomegranate?

586. The genus *AMYGDALUS* contains the Peach and the Almond. The latter is a native of warm countries, and seems to have been known in the remotest times of antiquity.

ORDER DI-PENTAGYNIA, from two to five pistils.

587. The four orders in the class Icosandria which follow the first, are included under one, called Di-pentagynia, signifying from two to five pistils. We find here the hawthorn, a shrub with deep green foliage, white flowers, and scarlet berries, and with very large and strong thorns. The genus *Pyrus* which contains the Apple and Pear, belongs here. The varieties of these fruits are the effect of cultivation, not the produce of different species. By means of grafting, which consists in inserting the sprout of one plant into the body or branches of another, good fruit may be produced upon a tree which before produced a poorer kind.

ORDER POLYGYNIA, many pistils.

588. We here find the Rose; this, in its natural state, contains but five petals; it is remarkable for its stamens and pistils changing to petals by cultivation. Several species of the Rose are indigenous to North America; as the small wild rose, the sweet briar, and swamp rose. *Red* and *white roses* are remarkable in English history as emblems of the houses of *York* and *Lancaster*; for when those families contended 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.—The Moss rose, *Rosa muscosa*, has its name from the moss-like substance with which the flower, stem, and calyx, are covered; it is in fact a collection of glands, containing a resinous and fragrant fluid. Roses are favourite plants in all countries where they are found; but it is remarkable that none have ever been met with growing wild 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 those flowers. The eastern nations, especially the Persian, boast of the beauty and splendour of their roses.

589. The Blackberry, (*Rubus*,) has a flower resembling the

586. Of the genus *Amygdalus*?

587. What is said of the order Di-pentagynia, and of some of the plants contained in it?

588. What is said of the Rose genus?

589. Of the different species of the *Rubus*?

rose in its general aspect: there are several species of the *Rubus*, one of which produces the common Blackberry, another the Red-raspberry, another the Black-raspberry, and another the Dew-berry. One species of the *Rubus*, the *oloratus*, produces large and beautiful deep red flowers; the fruit is dry, and not eatable.

590. The strawberry belongs to the same natural and artificial order as the Rose; these genera, with several others, form a natural family, sometimes called, from the appearance of the flower, Rosaceous plants, and sometimes from the fruit, which is a pome, Pomaceæ.

The gathering of strawberries in the fields, is among those rural enjoyments of childhood, which in after life are recollected with pleasure, not unfrequently mingled with melancholy reflections, upon the contrast of that happy season, with the sorrows with which maturer years are often shaded. Such reflections produced the following beautiful lines from a late female poet.*

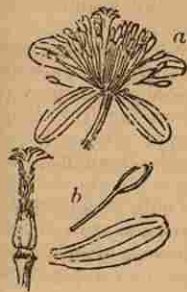
"The Strawberry blooms upon its lowly bed,
Plant of my native soil! The Lime may fling,
More potent fragrance on the zephyr's wing:
The milky Cocoa richer juices shed,
And white Guava lovelier blossoms spread;
But not, like thee, to fond remembrance bring,
The vanish'd hours of life's enchanting spring.
Short calendar of joys forever fled!
Thou bid'st the scenes of childhood rise to view
The wild wood path which fancy loves to trace,
Where, veiled in leaves, thy fruit of rosy hue,
Lurked on its pliant stem with modest grace,
But, ah! when thought would later years renew
Alas! successive sorrows crowd the space."

* Helen Maria Williams.

590. What is said of the Strawberry?

CLASS XII. POLYANDRIA, more than ten stamens inserted on the receptacle.

Fig. 83.



592. Fig. 83 represents, at *a*, a flower of the Clematis with *s* many stamens growing on the receptacle; *b* shows the receptacle with numerous short styles attached to it, *c* and *d* represent a stamen and petal which were inserted on the receptacle below the styles. On account of its many styles, the clematis is placed in the 13th order.

ORDER 1. MONOGYNIA, one pistil.

593. We find here some flowers of a curious appearance, as the Mandrake, or May-apple. This plant is common in moist, shady places, where you may often see several growing together; each stem supports a large white flower and two large peltate palmate leaves; the fruit is yellow, and eaten by many as a delicacy; the root is used in medicine.

594. The Side-saddle flower (*Sarracenia*) is a very curious and elegant plant; it has large leaves proceeding directly from the root. These leaves form a kind of cup, capable of containing a gill or more of water, with which liquid they are usually filled. The stem is of that kind called a scape, growing to the height of one or two feet, bearing a single large purple flower. This plant is found in swamps; its common name, Side-saddle flower, is given on account of the form of its leaf. It is sometimes call-

591. What remarks are made respecting Class Polyandria?

592. Describe Fig. 83.

593. What is said of the Mandrake or May-apple?

594. Describe the side-saddle flower.

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595. The White Pond Lily, is a splendid American plant, very fragrant and with a larger leaf than almost any other northern plant. The Yellow Pond Lily, though less showy, is equally curious in its structure.

The Poppy is a plant which may be found in almost every garden; it is a good example of this class. It affords a juice, which on being dried becomes opium.

596. In the same class and order is the Tea plant, (THEA;) of this there are two species, the bohea tea (*bohea*) and the green tea (*viridis*.) It is a small evergreen tree or shrub, much branched, and covered with a rough, dark coloured bark. The flowers are white, the leaves are lanceolate and veined, the capsule or seed vessel is three celled, it has three seeds, oblong and brown. This shrub is a native of China and Japan. Some suppose, that in reality, all the teas are taken from the same botanical species, and that the different flavour and appearance of them depend upon the nature of the soil, the culture, and the method of preparing the leaves.

597. Having mentioned under the first twelve classes some of the most important plants which belong to them, I shall not attempt to go farther at present; if you collect flowers, and prepare herbariums according to the directions given in the former part of this book, you will soon have some specimens of the 21 classes;—if you love Botany, you will not wait for your parents, and instructors to ask you to collect and study plants, but will seek every suitable opportunity for so doing. How delightful is the sight of a class of young pupils, engaged in examining flowers, each anxious to be the first to discover to what class and order they belong; and yet glad to have others succeed, where they find difficulties;—For true it is that a real and sincere love of knowledge, serves to render the disposition more amiable;—and it is for this purpose, and for the sake of leading your hearts to commune with your Maker by rendering you familiar with His works, that the friend who has laboured to prepare this book, is so anxious that you may learn to read and admire the great volume of nature, of which God is the Author.

595. What is said of the Pond Lilies?

596. Give an account of the Tea plant.

597. Why is the person who wrote this book, anxious that young persons should study the works of God?

EXERCISES IN PRACTICAL BOTANY

The following descriptions of Genera and Species have been selected from "Familiar Lectures on Botany," for the purpose of furnishing to the Beginner a series of Practical Exercises. Care has been taken to introduce such plants as Teachers can easily procure from the gardens and fields for their classes and which are the most simple for analysis.

DIRECTIONS FOR PRONOUNCING THE NAMES OF PLANTS.

BOTANICAL names of plants are formed according to the analogies of the ancient languages, chiefly the Latin. Some of the most common terminations of names of Genera and Species are *a*, *um*, *us*, and *is*; for example, the generic names, GERARDIA, TRIFOLIUM, PRUNUS, and IRIS; and the specific names *virginica*, *candidum*, *blandus*, and *officinalis*. A great proportion of Botanical names terminate in *a*, in which case it has the sound of *a* in father, as Rosa, Viola, &c.

The letter *e* at the end of a word is always to be sounded for example, *Anemone*, pronounced *anem'-o-ne*.

The *e* is long before *s* when it ends a word, as *Bicorn' nes* pronounced *Bicorn'es*.

In words that end in *ides*, the *i* is long, as in *Hesper' ides*.

The vowels *ae* and *oe*, are often used as diphthongs, and then have the sound of *e*, as *Hepatica*, pronounced *Hepat'-i-ce*, and *Di-æcia*, pronounced *Di-e-cia*.

C and *g*, as in English, are soft before *e*, *i*, and *y*, and hard before *a*, *o*, and *u*. The soft sound of *c*, is like *s*, the hard sound like *k*. The soft sound of *g*, is like *j*, the hard sound like *g*, in the word *gave*; thus *Algae* is pronounced *Alje*. *Musci* is pronounced *Mussi*.

The letters *ch*, are hard like *k*, as in *Orchis*; pronounced *Or-kis*.

Explanation of Letters and Characters.

The letter *o*, when affixed to the specific description, stands for the Latin *omnibus locis*, in all places, meaning that the plant is common; *r* denotes that the colour of the flower is red. *p*. purple—*y*. yellow—*w*. white—*b*. blue—*g*. green—*Ap*. denotes that the flower blossoms in April—*M*. May—*J*. June—*Ju*. July—*Au*. August—*S*. September—*Oc*. October—*Var*. stands for *Variety*.

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The following characters denote the duration of a plant.

⊙ annual—♂ biennial—⊔ perennial—h woody.

Accent and quantity.

The marks over the generic and specific names have reference not only to the syllable which is to be accented, but to the quantity of the vowel in the accented syllable, as either long or short.

Those syllables over which the *single mark* is placed have the vowel pronounced long, as in *Fra-gá-ri-a*; those over which the *double mark* is placed, have the vowel pronounced short, as in *He-pat'-i-ca*; in the latter case, the stress of voice seems thrown upon the consonant; the two marks may, therefore, be considered as indicating that the consonant, as well as vowel, is accented.

The general rule respecting words of two syllables is simple, and renders it unnecessary to prefix to such words the marks for accent and quantity.

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NOTE—It would be well for the teacher to request the pupil to commit to memory the directions for pronouncing the name of plants—the signification of the letters—and to observe particularly the marks used to point out accent and quantity.

DESCRIPTION OF GENERA OF PLANTS.

CLASS I. MONANDRIA. *One Stamen.*

Order 1. *Monogynia. One pistil.*

SALICOR'NIA. Calyx inflated, entire, 3 or 4-sided, obconic; corolla 6; style 2-cleft; seed 1, enclosed in the calyx.—(samphire.)

Order 2. *Digynia. Two pistils.*

BLITUM. Calyx 3-cleft, or 3-parted, berry-like; corolla 0; seed 1, immersed in the calyx.—(blite.)

CLASS II. DIANDRIA. *Two Stamens.*

Order 1. *Monogynia. One pistil.*

A. *Corolla 1-petaled, inferior, regular; seeds in a drupe or nut.*

CHIONAN'THUS. Calyx 4-parted; corolla 4-parted, with very long divisions; nucleus of the drupe, striate-fibrous.—(fringe-tree.)*

Exotic.

JAS'MINUM. Corolla salver-form, 5 to 8 cleft; berry 2-seeded, each seed solitary, arilled.—(jasmine.)

SYRIN'GA. Corolla salver-form; capsule 2-celled.—(lilac.)

B. *Corolla 1-petaled, inferior, irregular; seeds in capsules.*

VERON'ICA. Calyx 4-parted; corolla cleft into 4 lobes, lower division smaller; capsule obcordate, few-seeded, 2-celled.—(speedwell.)

CATAL'PA. Corolla 4 or 5-cleft, somewhat inflated, bell-form; calyx 2-parted or 2-leaved; stigma 2-lipped; capsule cylindrical, 2-celled.—(catalpa tree.)

C. *Corolla 1-petaled, inferior, irregular; seeds naked.*

MONAR'DA. Calyx cylindrical, striated, 5 toothed; corolla ringent tubular.—(Oswego tea, mountain mint.)

SAL'VIA. Calyx tubular, striated, 2-lipped, under lip 2 to 3-toothed, lower lip 2-cleft; corolla ringent, upper lip concave, lower lip broad, three-lobed, the middle lobe the largest, notched; stamens with two spreading branches, one of which bears a one-celled anther; germ four

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cleft: style thread-shaped, curved; seeds 4, in the bottom of the calyx.—(sage.)

D. *Corolla superior.*

CIRCŒA. Calyx 2-leaved or 2-parted; corolla 2-petaled; capsule hispid, 2-celled, not gaping; cells 1 or 2 seeded, seeds oblong.—(chanter's nightshade.)

Order 2. *Digynia. Two pistils.*

ANTHOXAN'THUM. Calyx of two egg-shaped, pointed, concave, chaffy scales; 1 flowered; corolla of two equal husks, shorter than the calyx, awned on the back; an internal corolla or nectary, consisting of two egg-shaped minute scales: stamens longer than the corolla; anther oblong, forked at both ends; germ superior: seed, 1.—(sweet vernal grass.)

CLASS III. TRIANDRIA. *Three Stamens*

Order 1. *Monogynia. One pistil.*

A. *Flowers superior.*

IRIS. Calyx spathe 2 or 3-valved: corolla 6-parted, divisions alternately reflexed: stigmas 3, petal-like: style short: capsule 3-celled. (flower-de-luce, iris or flag.)

Exotic.

CRO'CUS. Spatha radical: corolla funnel form, with a long slender tube; stigma deep-gashed, crested.—(saffron.)

IX'IA. Spatha 2 or 3 valved, ovate, short; corolla 6-parted or 6-petaled; sometimes tubular: stamens strait or incurved; stigmas subfiliform.—(black-berry lily.)

Order 2. *Digynia. Two pistils.*

A. *Calyx and corolla of a similar texture—flowers in spreading panicles.*

AGROS'TIS. Calyx herbaceous, 2-valved, 1-flowered, valves acute, a little less than the corolla: corolla 2-valved, membranaceous, often hairy at the base: stigmas longitudinally hispid or plumose: florets spreading; nectary lateral; seed coated.—(redtop.)

Calyx and corolla of similar texture—flowers in compact panicles, often spikeform.

PHLE'GUM. Calyx hard, 2-valved, equal, sessile, linear, truncate, bicuspidate; corolla enclosed in the calyx, 2-valved, awnless, truncate.—(timothy-grass.)

B. *Spikelets 1 flowered; corolla with 1 or 2 abortive rudiments of flowers at the base.*

Calyx and corolla of similar texture.

PHALA'RIS. Calyx membranaceous, 2-valved, valves keeled, nerved, equal in length, including the 2-valved pilose corolla. The corolla is

shorter than the calyx and coriaceous: rudiments opposite, sessile, resembling valves: nectary lateral.—(ribbon-grass.)

C. *Spikelets many-flowered.*

PO'A. Spikelets oblong or linear, compressed, many-flowered; calyx shorter than the florets: corolla herbaceous, awnless, often arachnoid at the base; lower valve scarious at the margin.—(spear-grass.)

Exotic.

SORG'HUM. Florets in pairs, one perfect, with a 3-valved corolla, and sessile; the other staminate or neutral, and pedicelled.—(broom corn.)

DAC'TYLIS. Spikelets aggregated in unilateral heads, many flowered: calyx shorter than the florets, with one large glume, keeled, pointed: corolla with the lower valve keeled, emarginate, mucronate.—(orchard grass.)

AVE'NA. Calyx 2-valved; 2, 3, or many flowered: corolla valves mostly bearded at the base, lower one torn, with a twisted awn on the back: glumes membranaceous, and somewhat follicle-like; seed coated.—(oats.)

mm

D. *Flowers in spikes.*

TRITICUM. Calyx 2-valved, about 3-flowered; florets sessile on the teeth of the rachis, obtusish and pointed; glumes beardless, or interruptedly bearded.—(wheat.)

SECA'LE. Calyx 2-valved, 2 or 3-flowered: spikelets sessile on the teeth of the rachis, with the terminal floret abortive: glumes subulate, opposite, shorter than the florets: corolla with the lower valve long-awned.—(rye.)

CLASS IV. TETRANDRIA. *Four Stamens.*

Order 1. *Monogynia. One pistil.*

A. *Flowers superior.*

(1-petaled.)

CEPHALAN'THUS. Inflorescence in a head; general calyx none, proper calyx superior, minute, angular, 4-cleft: corolla funnel-form: receptacle globular, hairy: seed solitary, oblong.—(button-bush.)

HOGSTONIA. Calyx half superior, 4-toothed: corolla salver-form, 4-cleft; capsule 2-celled, many-seeded, opening transversely.—(innocence.)

(4-petaled.)

COR'NUS. Calyx 4-toothed: drupe with a 2-celled nut. Some species have a 4-leaved involucre.—(dogwood, false box.)

Southern.

LYCUM. Corolla tubular, having the throat closed by the beards of the filaments: stamens often 5: berry 2-celled; many seeded.—(matrimony.)

CLASS V. PENTANDRIA. *Five Stamens.*Order 1. *Monogynia. One pistil.*A. *Flowers 1-petaled, inferior; seeds naked in the bottom of the calyx*
Rough Leaved Plants.

CYNOGLOSSUM. Calyx 5-parted; corolla short, funnel-form, vaulted; throat closed by five converging convex processes; seeds depressed, affixed laterally to the style.—(hound's-tongue.)

BORAGO. Corolla wheel-form, the throat closed with rays.—(borage.)

B. *Flowers 1-petaled, inferior; seeds covered.*
(Capsule 1-celled.)

LYSIMACHIA. Calyx 5-cleft; corolla wheel-form, 5-cleft; capsule 1-celled globular, 5 or 10-valved, mucronate; stigma obtuse. (In some species the filaments are united at the base.)—(loose-strife.)

(Capsule 2-celled—rarely 3-celled.)

VERBAS-CUM. Calyx 5-parted; corolla wheel-form, 5-lobed, somewhat irregular, stamens declined, hairy; capsules 2-celled, 2-valved; valves inflexed when ripened, many-seeded.—(mullein.)

CONVOLVULUS. Calyx 5-parted, with or without 2 bracts; corolla funnel-form, plaited; stigma 2-cleft or double; cells of the capsule 2 or 3; each 1 or 2 seeded.—(blind-weed—morning glory.)

(Capsule 3 to 5-celled.)

PHLOX. Calyx prismatic, 5-cleft; segments converging; corolla salver-form, 5-lobed, with a tube somewhat curved; filaments unequal in length, attached to the inside of the tube of the corolla; stigmas 3-cleft; cells 1-seeded, seeds oblong; concave.—(lichnidia.)

DATURA. Calyx tubular, angled, caducous, with a permanent orbicular base; corolla funnel-form, plaited; capsule 4-valved, 2-celled, and each cell half divided; generally thorny.—(thorn-apple.)

(Seed in a berry.)

SOLA-NUM. Calyx 5 to 10-parted, permanent; corolla bell or wheel form, 5-lobed, plaited; anthers thickened, partly united, with two pores at the top; berry containing many seeds, 2 to 6-celled.—(potato, nightshade, bitter-sweet.)

Exotic.

CAP-SICUM. Corolla wheel-form; berry juiceless, inflated; anthers converging; calyx angular.—(red pepper.)

C. *Flowers 1-petaled, superior.*
(Seeds in a capsule.)

CAMPANULA. Calyx mostly 5-cleft; corolla bell-form, closed at the bottom by valves bearing the flattened stamens; stigma 3 to 5-cleft; capsules 3 to 5-celled, opening by lateral pores.—(bell flower.)

LOBELIA. Calyx 5-cleft; corolla irregular, often irregularly slit; anthers cohering, and somewhat curved; stigma 2-lobed; capsule 2 or 3-celled.—(cardinal flower, wild tobacco.)

LONICE-RA. Calyx 5-toothed; corolla tubular, long, 5-cleft unequal,

stamens exsert; stigmas globose; berry 2 or 3-celled, distinct; seeds many—(trumpet honey suckle.)

Exotic.

MIRABILIS. Corolla funnel-form, compressed below; calyx inferior; germ between the calyx and corolla; stigma globular.—(four o'clock.)

*Flowers 5-petaled, inferior.**(Seed in a capsule.)*

IMPATIENS. Calyx 2-leaved, deciduous; corolla irregular, spurred, anthers cohering at the top; capsule 5-valved, bursting elastically when ripe.—(touch-me-not, jewel weed.)

VIOLA. Calyx 5-leaved or deeply 5-cleft, corolla irregular, with a horn behind; (sometimes it is a mere prominence); anthers attached to a membranous tip, or slightly cohering; capsule 1-celled, 3-valved.—(violet.)

CELASTRUS. Calyx 5-lobed; flat; corolla spreading; capsule obtusely 3-angled, 3-celled, berry-like; valves bearing the parities on their centres; cells 1 or 2-seeded; stamens standing around a glandular 5-toothed disk; style thick; stigma 3-cleft; seeds calyptred or arilled.—(staff tree, false bittersweet.)

E. *Flowers 5-petaled, inferior.*

RIBES. Calyx bell-form, 5-cleft, (sometimes flat); corolla and stamens inserted on the calyx; style 2-cleft; berry many seeded. 36. 83.—(currant, goose-berry.)

Order 2. *Digynia. Two pistils.*A. *Corolla 1-petaled, inferior.*

GENTIANA. Calyx 4 or 5-cleft; corolla with a tubular base, bell-form, without pores, 4 or 5-cleft, stigmas 2, sub-sessile, capsule 1-celled oblong; columellas 2, longitudinal; stamens but 4, when the divisions of corolla are 4.—(gentian.)

Exotic.

Plants umbelliferous; flowers 5-petaled, superior; seeds 2.

(Seeds prickly or hispid.)

Daucus. Seeds striate on their joining sides; outer sides convex hispid ribs; involucre pinnatifid; flowers sub-radiated, abortive in the disk.—(carrot.)

Exotic.

ANETHUM. Seeds flat or convex, 5-ribbed; germ lenticular, compressed; calyx and petals entire; involucre none.—(fennel, dill.)

Order 3. *Trigynia. Three pistils.*A. *Flowers superior.*

VIBURNUM. Calyx 5-parted or 5-toothed, small; corolla bell-form, 5-cleft, with spreading or reflexed lobes; stigmas almost sessile; berry or drupe 1-seeded.—(snow ball, sheep-berry, high cranberry.)

SAMBUCUS. Calyx 5-parted or 5-cleft, small; corolla sub-urceolate; 5-cleft; stigma minute, sessile; berry globose, 1-celled 3-seeded elder.)

LI'NUM. Calyx 5-leaved or 5-parted, permanent; corolla 5-petaled inferior, with claws; capsule 5 or 10-valved, 10-celled; seeds solitary, ovate, compressed; filaments spreading or united at the base.—(flax.)

CLASS VI. HEXANDRIA. *Six Stamens*

Order 1. *Monogynia. One pistil.*

A. *Flowers having a perianth and corolla, without a spathe.*

TRADESCAN'TIA. Calyx inferior, 3-leaved; corolla 3-petaled; filaments with jointed beards; capsules 3-celled, many-seeded.—(spiderwort.)

B. *Flowers having a spathe or glume, without a perianth.*

AMARYL'LIS. Corolla superior, 6-petaled, unequal; filaments unequal in proportion or direction, declined, inserted in the throat of the tube.—(atamask lily.)

Exotic.

GALAN'THUS. Petals 3, concave, superior; nectarines (or inner petals) 3, small, emarginate; stigma simple.—(snowdrop.)

C. *Flowers having no calyx.*

LI'LIIUM. Corolla liliaceous, inferior, 6-petaled; petals with a longitudinal line from the middle to the base; stamens shorter than the style; stigma undivided; capsule sub-triangular, with the valves connected by hairs crossing as in a sieve.—(lily.)

ERYTHRO'NIUM. Corolla liliaceous, inferior, 6-petaled; petals reflexed, having two pores and two tubercle-form nectarines at the base of the three inner alternate petals; capsule somewhat stiped; seeds ovate.—(dog-tooth violet, or adder-tongue.)

ASPAR'AGUS. Corolla inferior, 6-parted, erect, the three inner divisions reflexed at the apex; style very short; stigmas 3; berry 3-celled, cells 2-seeded.—(asparagus.)

Exotic.

TU'LIPA. Corolla 6-petaled, liliaceous, style 0; stigma thick; capsule oblong, 3-sided.—(tulip.)

FRI'TILLA'RIA. Corolla inferior, 6-petaled, bell-form, with a nectariferous cavity above the claw of each; stamens of the length of the corolla; seeds flat.—(crown imperial.)

Order 3. *Tryginia. Three pistils.*

TRIL'LIIUM. Calyx 3-leaved, inferior, spreading; corolla 3-petaled styles 0; stigmas 3; berry 3-celled, many seeded.—(false wake robin.)

CLASS VII. HEPTANDRIA. *Seven Stamens.*

Order 1. *Monogynia. One pistil.*

ES'CLUSUS. Calyx inflated; 4 or 5-toothed; corolla 4 or 5-petaled inserted on the calyx, unequal, pubescent; capsule 3-celled; seeds large, solitary, chestnut-form.—(horse chestnut.)

CLASS VIII. OCTANDRIA. *Eight Stamens.*

Order 1. *Monogynia. One pistil.*

OENO'THERA. Calyx 4-cleft, tabular, caducous, divisions reflected, petals 4, inserted on the calyx; stigma 4-cleft; capsule 4-celled, 4-valved; seeds not feathered, affixed to a central 4-sided columella.—(cassia, or evening primrose.)

TROPE'OLUM. Calyx 4 or 5-cleft, coloured spurred; petals 4 or 5, unequal; nuts leathery, sulcate.—(nasturtion)

CLASS IX. ENNEANDRIA. *Nine Stamens.*

Order 1. *Monogynia. One pistil.*

LAU'RUS. Calyx 4 to 6-parted; corolla 0; nectarines 3, each a 2-bristled or 2-lobed gland, surrounding the germ; drupe 1-seeded. Stamens vary from 3 to 14, but they are generally in two series of 6 each, with 3 of the inner series barren—often dioecious. The calyx may be taken for a corolla.—(sassafras, spice-bush.)

CLASS X. DECANDRIA. *Ten Stamens.*

Order 1. *Monogynia. One pistil.*

A. *Flowers polypetalous, irregular, (mostly papilionaceous.)*

CAS'SIA. Calyx 5-leaved; corolla 5-petaled; anthers 3, lower ones beaked, and on longer incurved filaments; legume membranaceous cassia.)

B. *Flowers polypetalous, regular.*

PY'ROLA. Calyx 5-parted, petals 5; styles longer than the stamens, anthers with two pores at the base before, and the top after the opening of the flower; capsule 5-celled, dehiscent at the angles near the base.—(shin leaf.)

CHIMAPH'ILA. Calyx 5-parted; petals 5; anthers beaked, with 2 pores at the base before, and at the top after the opening of the flower; style immersed; stigma thick, orbiculate; capsule 5-celled, dehiscent at the angles near the summit.—(prince's pine, pipsissiwa.)

Exotic.

RU'TA. Calyx 5-parted; petals concave; receptacle surrounded by 10 nectariferous dots; capsule lobed. (Petals sometimes 4, and stamens 8.)—(rue.)

C. *Flowers monopetalous.*

EPIGE'A. Calyx double, outer 3-leaved, inner 5-parted; (or calyx 5-parted, with 3 bracts;) corolla salver-form; border 5-parted, spreading; tube villose within; capsule 5-celled, many-seeded; receptacle 5-parted.—(trailing arbutus.)

VACC'NIUM. Calyx superior, 5 toothed or 5-parted, corolla bell or pitcher form, 5-cleft, the divisions reflected. filaments inserted on the

germ with the corolla; berry 4 or 5-celled, many-seeded. (The to-reign species are sometimes octandrous.*)—(whortleberry.)

KAL'MIA. Calyx 5-parted; corolla wheel-salver-form, with 10 horns beneath, and 10 cavities within, containing the anthers until the pollen is mature; capsule 5-celled, many-seeded.—(laurel.)

D. *Flowers without a calyx: (or with a coloured petal like a calyx,) whole plant destitute of green herbage.*

MONOTROPA. Corolla confusedly polypetalous, permanent; petals about 5, with nectariferous hollows at their bases; anthers reniform, subpetalate, 1-celled, giving out pollen by 2 holes near the middle; stigma orbicular, not bearded; capsule 5-celled, 5 valved.—(bird's nest, Indian pipe.)

Order 2. Digynia. Two pistils.

HYDRANGEA. Calyx 5-toothed, superior; corolla 5-petaled; capsule 2-celled, 2-beaked, dehiscent between the beaks.

SAXIFRAGA. Calyx 5-parted, half superior; corolla 5-petaled; capsule 2-celled, 2-beaked, opening between the beaks; many-seeded.—(saxifrage.)

SAPONARIA. Calyx inferior, 1-leaved, tubular, 5-toothed, without scales; petals 5, with claws; capsule oblong, 1-celled.—(soap wort.)

DIANTHUS. Calyx inferior, cylindrical, 1-leaved, with 4 or 6 scales at the base; petals 5, with claws; capsule cylindrical, 1-celled, dehiscent at the top.—(pink, sweet-william.)

Order 3. Trigynia. Three pistils.

SILENE. Calyx 1-leaved, tubular or conic, 5-toothed; petals 5, with claws, generally crowned at the orifice; capsule 3-celled, 6 toothed, many-seeded.

Order 5. Pentagynia. Five pistils.

AGROSTEMMA. Calyx 5-cleft, prismatic or tubular; coriaceous; petals 5, with claws; border obtuse, entire; capsule 1-celled, many-seeded, opening with 5 teeth.—(cockle.)

Order 10. Decagynia. Ten pistils.

PHYTOLACCA. Calyx 9; corolla 5-petaled or 5-cleft, calyx-like, inferior; berry 10-cell, 10-seeded. By some authors the calyx is called a corolla.—(poke-weed.)

CLASS XI. ICOSANDRIA. *More than Ten Stamens situated on the Calyx.*

Order 1. Monogynia. One pistil.

PRUNUS. Calyx-cleft, inferior, bell-form; corolla 5-petaled; nut ⁶

* Having eight stamens.

the drupe smooth, with prominent seams at the sutures.—(cherry plum.)

Exotic.

AMYGDALUS. Calyx 5-cleft, inferior; petals 5, drupe with a nut, perforated with pores, flowers sessile.—(peach.)

PHILADELPHUS. Calyx 4 or 5-parted, superior, top-form; corolla 4 or 5-petaled; style 4-cleft; capsule 4 or 5-celled, many-seeded; seed arilled.—(false syringa, or mock orange.)

Order 2. Digynia, to Order 5. Pentagynia; or Dipentagynia. From two to five pistils.

CRATEGUS. Calyx superior, 5-cleft; petals 5; styles 1 to 5; berry mealy; seeds 2 to 5, bony.—(thorn-bush.)

ARONIA. Calyx superior, 5-toothed; petals 5; fruit pomaceous; berry 5 or 10-celled; cells 1 or 2-seeded; seeds cartilaginous.—(shad-flower, choke berry.)

PYRUS. Calyx 5-cleft, superior; corolla 5-petaled; pome 5-celled, many-seeded; seeds compressed-ovate.—(pear, apple, quince.)

Order 13. Pologynia. Many pistils.

ROSA. Calyx urn-form, inferior, 5-cleft, fleshy; contracted towards the top; petals 5; seeds numerous, bristly, fixed to the sides of the calyx within. A genus remarkable for the multiplication of its petals, by rich culture.—(rose.)

RUBUS. Calyx 5-cleft, inferior; corolla 5-petaled; pistils numerous; berry composed of many juicy, 1-seeded acines, on a dry receptacle.—(raspberry, black-berry.)

FRAGARIA. Calyx inferior, 10-cleft; 5 alternate divisions smaller; corolla 5-petaled; receptacle ovate, berry-like; acines naked, immersed in the receptacle, caducous.—(strawberry.)

CLASS XII. POLYANDRIA. *More than ten Stamens situated on the receptacle.*

Order 1. Monogynia. One pistil.

SANGUINARIA. Calyx caducous, 2-leaved; corolla about 8-petaled, stigma sessile, twinned, 2-grooved; capsule pod-like, ovate, 1-celled, 2-valved, acute at each end; valves caducous; columella 2, permanent.—(blood-root.)

PODOPHYLLUM. Calyx 3-leaved, minute; corolla about 9-petaled, stigma large, crenate, sessile; berry 1-celled, crowned with the stigma, large, many-seeded; columella one-sided.—(wild mandrake.)

Exotic.

PAPAVER. Calyx 2-leaved, caducous; corolla 4-petaled; stigma a broad disk, with radiating lines; capsule 1-celled, dehiscent by pores under the permanent stigma.—(poppy.)

Order 2. Digynia, to Order 5. Pentagynia, or Di-Pentagynia.

DELPHINIUM. Calyx 0; corolla 5-petaled, unequal; nectary, 2-c left

horneed behind; capsules 1 or 3, pod-like. By some the corolla is considered as a coloured calyx.—(larkspur.)

AQUILEGIA. Calyx 0; petals 5, caducous; nectaries 5, alternating with the petals, and terminating downwards in a spur-like nectary; capsules 5, erect; acuminate with the permanent styles, many-seeded. By some the nectaries are considered as petals, and the corolla as a coloured calyx.—(columbine.)

HYPERICUM. Calyx 5-parted; divisions equal, sub-ovate; corolla 5-petaled; filaments often united at the base in 3 or 5 sets; styles 2 to 5; capsules membranaceous, roundish, with a number of cells equal to the number of styles. The bases of the filaments are often in groups, when they are not united.—(St. John's wort.)

Exotic.

PEONIA. Calyx 5-leaved; petals 5; styles 0; stigmas 2 or 3; capsules pod-like, many-seeded. Remarkable for the multiplication of petals by rich culture.—(peony.)

Order 13. Polygynia. Many pistils.

A. Perianth none.

CLEMATIS. Petals 3, 4, 5, or 6; seeds compressed; styles permanent, becoming long plumose tails. (Some species are dioecious.) (virgin's bower.) By some the corolla is considered a coloured calyx.

ANEMONE. Petals 5 to 9; seeds numerous, naked.—(wind-flower, rue anemone.) The corolla is considered a calyx by some.

CALYTHA. Petals 5 to 9; orbicular; capsules numerous, (5 to 10), many-seeded, compressed; 1-celled, spreading; nectaries 0. (Pistils variable in number.)—(American cowslip.) By some the corolla is mistaken for a coloured calyx.

B. Having a perianth.

HEPATICA. Calyx 3-leaved, a little distance below the corolla, entire; petals 6 to 9; seeds without tails.—(liverleaf.)

RANUNCULUS. Calyx 5-leaved; petals 5, with claws, and a nectariferous pore or scale on the inside of each; seeds without tails, naked, numerous.—(crow-foot.)

CLASS XIII. DIDYNAMIA. Having Four Stamens. Two Stamens longer than the other two.

Order 1. Gymnospermia. Seeds naked in the Calyx.

A. Calyx 5-cleft, with the divisions, or teeth, nearly equal.

MENTHA. Corolla nearly equal, 4-lobed; broadest division, emarginate; stamens erect, distant.—(spearmint, peppermint.)

HEDEOMA. Calyx 2-lipped, gibbose at the base; upper lip with 3 lanceolate teeth; lower lip with two subulate ones; corolla ringent; 2 short stamens barren.—(pennyroyal.)

NEPETA. Calyx dry, striate; corolla with a longish tube; under lip with the middle division crenate, throat with a reflected margin; stamens approximate.—(catmint.)

GLECHOMA. Calyx 5-cleft; corolla double the length of the calyx; upper lip 2-cleft, lower lip 3-cleft, with the middle segment emarginate;

nate; each pair of anthers approaching so as to exhibit the form of a cross.—(ground ivy, gill-overground.)

Exotic.

LAVAN'DULA. Calyx ovate, sub-dentate; bracts under-studded; corolla resuplicate; stamens in the tube.—(lavender.)

B. Calyx 2-lipped.

PRUNELLA. Calyx with the upper lip dilated; filaments 2-forked, with an anther on one of the points; stigma 2-cleft.—(self-heal, or heal-all.)

SCUTELLARIA. Calyx with an entire mouth, which is closed with a helmet-form lid after the corolla falls out; tube of the corolla bent—(scull-cap.)

Exotic.

THYMUS. Calyx sub-campanulate, with the throat closed with hairs; corolla with the upper lip flat, emarginate; lower lip longer.—(thyme.)

Order 2. Angiospermia. Seeds in a capsule.

ANTIRRHINUM. Calyx 5-leaved or deeply 5-parted; the two lower divisions remote; corolla personate or ringent, spurred, or with a prominent base; the throat closed with a prominent palate; capsule ovate, 2-valved, dehiscent at the apex, with reflexed teeth.—(snap-dragon, toad-flax.)

GERANIUM. Calyx 5-cleft or 5-toothed; corolla sub-campanulate, unequally 5-lobed; segments mostly rounded; capsule 2-celled, dehiscent at the top.—(false foxglove.)

PENTSTEMON. Calyx 5-cleft or 5-leaved; corolla ringent, inflated; the rudiment of a bearded filament between, and longer than two tallest stamens; anthers smooth; capsule 2-celled, 2-valved, ovate; seeds numerous, angular.—(beard tongue.)

CLASS XIV. TETRADYNAMIA. Having six stamens—Four stamens longer than the other two.

Order 1. Siliculosa. Short pod.

Exotic.

LUNARIA. Silicle entire, oval, flat-compressed, pedicelled; valves equaling the partition, parallel, flat; calyx consists of coloured sack-like leaflets. 39, 63.—(honesty, or satin-flower.)

Order 2. Siliquosa. Long pod.

CHEIRANTHUS. Calyx closed, two of the leaflets gibbous at the base; petals dilated; silique, when young with a glandular tooth each side; stigma 2-lobed; seed flat, sometimes margined.—(stock-july-flower, wall-flower.)

SINAPIS. Calyx spreading; corolla with strait claws; glands between the short stamens and the pistil, and between the long stamens;

and the calyx; partition extending beyond the valves of the silique unisiform; seeds in a single series.—(mustard.)

RAPHANUS. Calyx closed, silique, terete, not opening by valves, 1 or 2-celled; glands between the short stamens and pistil, and between the long stamens and the calyx.—(radish.)

Exotic.

BRASSICA. Calyx erect, converging; partition extending beyond the valves of the silique; seed globose; glands between the short stamens and pistil, and between the long stamens and calyx.—(cabbage, turnip.)

CLASS XV. MONADELPHIA. *Stamens united by filaments in one set.*

Order 3. Triandria. Three stamens.

SISIRYNCHIUM. Spatha 2-leaved; perianth 0; corolla superior, 6 cleft or 6-petaled, tubular; style 1; stigma 3-cleft; capsule 3-celled. (blue-eyed grass.)

Order 5. Pentandria.

Exotic.

ERODIUM. Calyx 5-leaved; corolla 5-petaled; nectariferous scales 5, alternating with the filaments; anils 5, 1-seeded, awned, beaked at the base of the receptacle; awn spiral, bearded within.—(stork's bill.)

Order 7. Heptandria. Seven stamens.

Exotic.

PELARGONIUM. Calyx 5-parted, upper division broader, ending in a capillary nectariferous tube; corolla 5-petaled, irregular; the two upper petals usually broader, with coloured veins; filaments 10, 3 of them usually without anthers; anils 5, each 1-seeded, awned; some of the awns spiral.—(stork geranium.)

Order 10. Decandria. Ten stamens.

GERANIUM. Calyx 5-leaved; corolla 5-petaled, regular; nectariferous glands 5, adhering to the base of the 5 alternating long filaments; anils 5, 1-seeded, awned, beaked at the elongated top of the receptacle; awn naked or smooth within, straight. 14. 73.—(cranebill, false crow-foot, herb-robert.)

Order 12. Polyandria. Many stamens.

ALTHEA. Calyx double, outer one 6 or 9-cleft; capsules many, arranged circularly, 1-seeded.—(hollyhock.)

MALVA. Calyx double, outer one 3-leaved, inner one 5-cleft; capsules many, arranged circularly, 1-celled, 1-seeded.—(mallows.)

CLASS XVI. DIADELPHIA. *Stamens united by filaments in two sets.*

Order 5, to Order 8. Pent-octandria. From 5 to 8 stamens.

POLYGALA. Calyx 5-leaved, permanent, unequal, 2 of the leaflets wing-like, larger, coloured, corolla irregular (or rather, calyx 3-leaved, corolla imperfectly papilionaceous;) capsule obcordate, 2-celled 2-valved. Keel of the corolla sometimes appendaged: seeds hairy (snake root, milk-wort, low centaury, mountain flax.)

Order 10. Decandria. Ten stamens.

Legume without transverse divisions or portions; seeds numerous.

(Stigma pubescent.)

PISUM. Calyx with the divisions leaf-like, about equal; banner protruding 2 folds: style compressed, carinate, villose above: legume without down at the suture.—(pea.)

LATHYRUS. Calyx with the two upper divisions shorter: style flat, villose above, broader towards the top. (Stems mostly winged, leaflets 2 or more, terminated by a divided tendril.)—(sweet pea.)

(Stigma not pubescent.)

PHASEOLUS. Keel stamens and style spirally twisted together; legum compressed, falcate; seeds sub-compressed, reniform.—(bean.)

ROBINIA. Calyx small, bell-form, 4-cleft, upper division 2-parted: banner large, reflexed, roundish, legume compressed, elongated, many seeded; seeds compressed, small.—(locust tree.)

TRIFOLIUM. Flowers sub-capitate; legume included in the calyx, not opening by valves, 1 to 4-seeded. Leaves always ternate. (clover.)

LEPINUS. Calyx 2-lipped, anthers, 5 oblong and 5 roundish; legume coriaceous.—(lupine.)

CLASS XVII. SYNGENESIA. *Anthers united.*

Order 1. Polygamia Æqualis. Disk and ray florets perfect ®

A. Floret ligulate.

LEONTODON. Calyx imbricate, with flexible leaflets; receptacle naked; egret stiped.—(dandelion.)

LACTUCA. Calyx imbricate, cylindrical, with the margin of the scales membranaceous; receptacle naked; egret simple, stiped; seed smooth.—(lettuce.)

CARDUUS. Calyx ovate, imbricate with prickly scales; receptacle villose; egret pilose.—(comb-tooth thistle.)

CINARA. Receptacle bristly; calyx dilated, imbricate, scales with

fleshy bases, emarginate and pointed; egret plumose, sessile.—(garden artichoke.)

B. *Florets tubulous; flower discoid.*

EUPATORIUM. Calyx imbricated (rarely simple) oblong; style long cloven halfway down; egret pilose, scabrous, or rough papillose; receptacle naked; seed smooth and glandular, 5 striate.—(boneset thoroughwort, joe-pye.)

Order 2. *Polygamia superflua. Florets of the disk perfect those of the ray having pistils only.*

A. *Flowers discoid; the ray florets being obsolete.*

TANACETUM. Calyx imbricate, hemispheric; scales acuminate, rays obsolete, 3-cleft; egret somewhat marginal; receptacle naked. (Flowers corymb.)—(tansey.)

GNAPHALIUM. Calyx imbricate with the marginal scales rounded scarious, shortish, glossy, coloured; receptacle naked; egret pilose or plumose, scabrous; florets of the ray subulate, of the disk entire. Sometimes all the florets are perfect.—(life everlasting.)

B. *Flowers radiate; the ligulate ray florets very manifest.*

(Receptacle naked.)

ASTER. Calyx imbricate, the inferior scales generally spreading, egret simple, pilose; receptacle often deep pitted. Florets of the ray more than 10, except in a few species; colour purple or white, never yellow.—(star-flower.)

SOLIDAGO. Calyx oblong or sub-cylindric, with oblong, narrow, pointed straight scales, imbricate, closed upon the flower; ray florets about 2, and fewer than 10, lanceolate, 2-toothed, equal to, or shorter than the calyx; filaments capillary, very short; style thread form, equalling the length of the stamens, stigma cleft, spreading; egret simple, pilose, scabrous; receptacle furrowed with dots or punctures; seed oblong ovate.—(golden rod.)

CHRYSANTHEMUM. Calyx hemispherical, imbricate, with the scales membranous at the margin; egret none, or a narrow margin.—(ox-eyed daisy, fever-few.)

Exotic.

BELLIS. Calyx hemispherical; scales equal; egret 0; receptacle conical; seed obovate.—(garden daisy.)

TAGETES. Calyx simple, 1-leaved, 5-toothed, tubular; florets of the ray about 5, permanent; egret 5 erect awns.—(marigold.)

(Receptacle chaffy or hairy.)

ANTHEMIS. Calyx hemispherical; scales with scarious margins, nearly equal; egret 0, or a membranous margin; florets of the ray more than 5; receptacle chaffy flat, with a rigid acuminate apex; seed crowned with a membranous border or egret.—(may-weed, chamomile.)

Order 3. *Polygamia Frustranea. Florets of the disk perfect, those of the ray having neither stamens nor pistils.*

HELLANTHUS. Calyx imbricate, sub-squarrose, leaty; receptacle

flat, chaffy; egret 2-leaved, chaff-like, caducous.—(sunflower, Jerusalem artichoke.)

CLASS XVIII. GYNANDRIA. *Stamens growing out of the pistil.*

Order 1. *Monandria. One stamen.*

A. *Anther adnate, sub-terminal, not caducous; masses of pollen affixed by the base, and made up of angular particles.*

ORCHIS. Corolla ringent-like, upper petal vaulted; lip dilated, spurred beneath; masses of pollen 2, adnate, terminal.—(orchis.)

Order 2. *Diandria. Two stamens.*

CYPRIPEDIUM. Calyx coloured, 4-leaved, spreading; corolla 0, (by some the calyx is called a corolla); nectary large, hollow, inflated; style with a terminant lobe, and petal-like appendage on the upper side.—(lady's slipper.)

Order 5. *Pentandria. Five stamens.*

Plants bearing seeds in follicles; and pollen in masses called pollinia.

ASCLEPIAS. Petals 5, reflected; nectaries 5, concave, erect, containing little horns; each stamen with a pair of pendulous masses of pollen, suspended from the top of the stigma; follicles smooth.—(milk-weed, silk-weed.)

CLASS XIX. MONECIA. *Staminate and pistillate flowers on the same plant.*

Order 3. *Triandria. Three stamens.*

TYPHA. Ament cylindric, dense-flowered. Staminate flowers calyx obsolete, 3-leaved; corolla 0; stamens 3 together, on a chaffy or hairy receptacle, united below into one. Pistillate flowers—below the staminate; calyx 0; corolla 0; seed 1, pedicelled; the pedicels surrounded at the base with long hairs resembling an egret.—(cat-tail or reed mace.)

CAREX. Aments imbricate (usually in cylindric spikes.) Staminate flowers—calyx scales single; corolla 0. Pistillate flowers—calyx scale single; corolla inflated, monopetalous, 2-toothed at the apex; stigmas 2 or 3; nut 3-sided, enclosed in the inflated, permanent corolla, which becomes an utriculose-like permanent aril. Sometimes dioecious.—(sedge.)

COMPTONIA. Staminate flowers—ament cylindric, with calyx scales 1 flowered; corolla 2-petaled or none; filaments 2-forked. Pistillate flowers—spike or ament ovate; corolla 6-petaled (the corolla may be called a calyx); styles 2; not oval, 1-celled.—(sweet fern.)

ZEA. Staminate flowers—calyx glume 2-flowered, awnless; corolla glume awnless. Pistillate flowers—calyx glume 2-valved (number of

valves increased by cultivation;) style 1, very long, filiform, pendulous; seed solitary, immersed in an oblong receptacle.—(Indian corn.)

Order 4. Tetrandria. Four stamens.

MO'RUS. Staminate flowers—calyx 4-parted; corolla 0. Pistillate flowers—calyx 4-leaved; corolla 0; styles 2, calyx becoming berry-like; seed 1.—(mulberry.)

Order 5. Pentandria. Five stamens.

AMARA'NTHUS. Staminate flowers—calyx 3 or 5-leaved; corolla 0; stamens 3 or 5. Pistillate flowers—calyx and corolla as the staminate; styles 3; capsule 1-celled, opening transversely; seed 1.—(amaranth, red cockscomb.)

Order 12. Polyandria. Many stamens.

A. Stems not woody.

SAGITTA'RIA. Staminate flowers—calyx 3-leaved; corolla 3 petaled; filaments mostly 24. Pistillate flowers—calyx and corolla as in the staminate; germs many; capsules aggregate, 1-seeded, not opening.—(arrow-head.)

AR'UM. Spatha cucullate, 1-leaved; spadix not entirely covered with fructification; being more or less naked above, with pistillate flowers beneath, and staminate in the middle (sometimes a few are staminate beneath; berry mostly 1-seeded, generally cirrose glandular beneath.)—(Indian turnip, wake-robin.)

B. Stems woody.

QUER'CUS. Staminate flowers—ament loose; calyx sub 5-cleft; corolla 0; stamens 5 to 10. Pistillate flowers—calyx 1-leaved, entire, scabrous, being a woody cup; style 1, stigma 2 to 5; nut or acorn 1-celled, 1-seeded, coriaceous, surrounded at the base by the permanent calyx.—(oak.)

CASTA'NEA. Polygamous. Staminate flowers—ament naked, linear; corolla (or calyx) 1-leaved, 5 or 6-parted; stamens 10 to 20. Pistillate flowers—calyx 5 or 6-leaved, (or 5 or 6-lobed) muricate; germs 3; stigma pencil-form; nuts 3, with coriaceous putamen, enclosed in the calyx, becoming echinate.—(chestnut.)

Order 15. Monadelphia. Filaments united.

A. Stems not woody.

Exotic.

CUCUR'BITA. Staminate flowers—calyx 5-toothed; corolla 5-cleft; filaments 3. Pistillate flowers—calyx and corolla like the staminate; pistil 3-cleft; pomaceous berry large, 3 to 5-celled; seeds thickened at the margin.—(gourd, squash, pumpkin, water-melon.)

RICINUS. Staminate flowers—calyx 5-parted; stamens numerous. Pistillate flowers, calyx 3-parted; styles 3 or 4-cleft; capsules echinate, 3-celled, 3-seeded.—(castor-oil plant.)

B. Stems woody.

PI'NUS. Staminate flowers—calyx 4-leaved, peltate; corolla 0; stamens many; anthers naked, 2, sessile, 1-celled. Pistillate flowers—calyx in strobiles or cones, scales closely imbricate, 2-flowered; pistil 1; nu. with a membranous wing.—(pine.)

CLASS XX. DICECIA. *Staminate and pistillate flowers on different plants.*

Order 2. Diandria. Two stamens.

SALIX. Staminate flowers—ament cylindric; calyx a 1-flowered scale, with a nectariferous gland at the base; stamens 1 to 6. Pistillate flowers—ament and calyx like the staminate; stigmas 2, generally 2-cleft; capsule 1-celled; 2-valved; seeds many, with egret-like down (willow.)

Order 5. Pentandria. Five stamens.

HUM'ULUS. Staminate flowers—calyx 5-leaved; corolla 0; anthers with two pores at the extremity. Pistillate flowers—calyx 1-leaved; entire, oblique, spreading; styles 2, seed 1, within the leaf-like calyx, inflorescence strobile-form.—(hop.)

Exotic.

CAN'NABIS. Staminate flowers—calyx 5-parted. Pistillate flowers—calyx 5-leaved, entire, gaping laterally; styles 2; nut 2-valved, within the closed calyx.—(hemp.)

Order 8. Octandria. Eight stamens.

PO'PULUS. Staminate flowers—ament cylindric, calyx a torn scale; corolla turbinate, oblique, entire, supporting 8 to 30 stamens. Pistillate flowers—ament, calyx and corolla like the staminate; stigma 4 or 6-toothed; capsule 2-celled, 2-valved, many-seeded; seed with egret-like hairs. Leaves have a tremulous motion.—(poplar, balsam of Gilead.)

NOTE. The 21st Class, Cryptogamia being too difficult for the beginner in Botany to analyze, is omitted.

DESCRIPTION OF SPECIES OF PLANTS.

7-1. **ÆSCULUS.** (From the Latin *Esca*, food.)

Exotic.

Hippocas'tanum, (horse-chestnut, w. J. 12) leaves digitate, with about 7 divisions; corolla 5-petaled, spreading; flowers in a panicle pyramidal. 15. f.

10-5. **AGROSTEMMA.** (From the Greek *Agros*, a field, and *stemma*, a garland.)

Githa'go, (cockle. O. r. J. 2) hirsute; calyx longer than the corolla; petals entire.

3-2. **AGROSTIS.** (From *Agres*, a field.)

Fulga'ris, (red-top. O. J. 2) panicle with smoothish branches, spreading in maturity; outer valve of the corolla 3-nerved; stipule short, truncate. 18. i.

15-13. **ALTHÆA.** (From the Greek *Altheo*, to heal.)

Officina'lis, (marsh mallows. 2) leaves downy, oblong ovate, obsoletely 3-lobed, toothed.

19-5. **AMARANTHUS.** (From a Greek word signifying *not withering*.)

Melancho'l'icus, (love-lies-bleeding. r. 2) glomerules axillary, peduncled, roundish; leaves lance ovate, coloured.

6-1. **AMARYLLIS.** (Latin name for a *nymph*.)

Exotic.

Formosis'sima, (jacoea. 2) spathe 1-flowered; corolla ringent-like; petals declined.

11-1. **AMGYDALUS.**

Exotic.

Per'sica, (peach. r. M. 12) serratures of the leaves all acute, flowers sessile, solitary. 15. f.

Na'na, (flowering almond. 12) leaves ovate, tapering to the base, sharply serrate. 3. f.

12-13. **ANEMONE.** (From the Greek *anemos*, the wind.)

Virg'inia'na, (wind-flower. O. g-w. Ju. 2) stem dichotomous; leaves

m threes, ternate, upper ones opposite; leaflets gashlobate and serrate-acute; peduncles solitary, 1-flowered, elongated; seed oblong, woolly, mucronate, in heads. 18. i.

Nemoro'sa, (low anemone. O. r-w. M. 2) stem 1-flowered; cauline leaves in threes, ternate; leaflets wedge-form, gash lobed, toothed, acute; corolla 5-6 petaled; seeds ovate, with a short style, hooked. A variety, *quinquefolia*, has lateral leaflets deeply 2-cleft. 6. i.

5 2. **ANETHUM.**

Exotic.

Grave'olens, (dill.) fruit compressed; plant annual.

Fani'culum, (fennel.) fruit ovate; plant perennial.

17-2. **ANTHEMIS.**

Col'ula, (mayweed. O. w. J. 2) receptacle conic, chaff bristly, seed naked; leaves 2-pinnate, leaflets subulate, 3-parted. 10. i.

Exotic.

No'bilis, (chamomile. w. Au. 2) leaves 2-pinnate; leaflets 3-parted; linear subulate, sub-villous, stem branching at the base. Fragrant. 4. i.

2-2. **ANTHOXANTHUM.** (From the Greek *Anthos*, a flower, and *Xanthus*, yellow.)

Oa'ra tum (sweet vernal grass. O. M. 2) spike oblong-ovate; florets sub-peduncled, shorter than the awn. An American variety, *altissimum*, is larger and of a dark green. An elegant substitute for the Leghorn grass. 10-18. i.

13-2. **ANTIRRHINUM.** (From the Greek *anti*, like, and *rin*, a snout.)

Lina'ria, (snap-dragon. y. Ju. 2) erect, glabrous; leaves scattered, lanceolate-linear, crowded together; spikes terminal, dense-flowered; calyx glabrous, shorter than the spur. Flowers large—(toad flax.) Naturalized. 12-18. i.

12-5. **AQUILEGIA.** (From *Aquila*, an eagle.)

Canaden'sis, (wild columbine. O. r. & y. Ap. 2) horns straight, stamens exsert, leaves decomposed. Growing frequently in crevices of rocks. 15. i.

Exotic.

Vulga'ris, (garden columbine. J. 2) horns incurved; leafy, stem and leaves glabrous; leaves decomposed. The nectariferous horn become numerous by culture; one hollow horn within another. 15. i.

11-5. **ARONIA.**

Botrya'num (shad bush, june-berry. O. w. Ap. 12) leaves obovate, cuspidate, glabrous when mature (when first expanded lanceolate

and downy;) flowers racemed; petals linear; germs pubescent; segments of the calyx glabrous.

19-12. ARUM.

Triphyl'ium, (Indian turnip wild turnip, wake robin, O. p. g. & w. M. 4) sub-caulescent; leaves ternate; leaflets ovate; acuminate, spadix club-form; spathe ovate, acuminate, peduncled with the lamina as long as the spadix. One variety, *virens*, has a green spathe, another, *atropurpureum*, has a dark purple spathe; another, *album* has a white spathe. 1-3. f.

18-5. ASCLEPIAS. (From *Aesculapius*, the Founder of Medicine.)

1. Leaves opposite.

Syri'aca, (common milkweed, O. w. p. Ju. 4) stem very simple, leaves lanceolate-oblong, gradually acute, downy beneath; umbels sub-nodding, downy, 3 to five feet high; flowers in large, close clusters, sweet-scented—pollinia are fly traps. 3-5. f.

Incarna'ta, (O. r. Ju. 4) stem erect, branching above, downy; leaves lanceolate, sub-downy both sides; umbels mostly double at their origin; the little horn of the nectary exsert. A variety *pulchra* is more hairy. Var. *glabra*, almost glabrous. Var. *alba*, has white flowers. Damp. 3. f.

6-1. ASPARAGUS. (A Greek name.)

Exotic.

Officina'lis, (asparagus, Ju. 4) stem herbaceous, unarmed, sub-erect, terete; leaves bristle-form, soft; stipules sub-solitary. Naturalized in the northern and southern districts. 4. f.

17-2. ASTER. (A Star.)

Leaves entire.

Linariifo'lius, (star-flower O. p. y. Au. 4) leaves thick-set, nerveless, linear, mucronate, dotted, carinate, rough, stiff, those on the branches recurved; stem sub-decumbent; branches level topped, 1-flowered; calyx imbricate, of the length of the disk; stem rough, purplish.

Multifo'rus, (O. w-y. Au. to Nov. 4) leaves linear, smoothish; stem very branching, diffuse, pubescent; branchlets one way; calyx imbricate; scales oblong, scurvy, acute.

Cyaneus, (O. b-p. Au. 4) leaves linear-lanceolate, clasping, smooth; stem wand-like-panicled, very glabrous; branches racemed; scales of the calyx lax, lanceolate, equalling the disk, inner ones coloured at the apex. 3-4. f. Flowers many and large. This is the handsomest of all asters.

Leaves more or less cordate and ovate, serrate, or toothed.

Panicula'tus, (O. b-p. Au. to Nov. 4) leaves ovate-lanceolate, subserrate, petioled, glabrous; radical ones, ovate heart form, serrate, rough, petioled; petioles naked; stem very branching, glabrous;

branchlets pilose; calyx lax, sub-imbricate. 2-4. f. Flowers smallish, numerous.

Cordifo'lius, (O. w. S. 4) leaves heart-form, pilose beneath, sharp serrate, petioled; petioles winged; stem panicled, smoothish; panicles divaricate; calyx lax, sub-imbricate. Flowers small.

Leaves lanceolate and ovate, lower ones serrate.

Exotic.

Chinen'sis, (china aster. ☉) leaves ovate, thickly toothed, petioled, cauline ones sessile, at the base wedge-form; floral ones lanceolate, entire; stem hispid; branches 1-flowered; calyx foliaceous. A variety has very full flowers, various coloured, and very short rays. Cultivated.

3-1. AVENA.

Exotic.

Sati'va, (oats S. ☉) panicled; calyx 2-seeded; seeds smooth, one of them awned.

17-2. BELLIS. (Perhaps from the Latin *Bellus*, handsome.)

Exotic.

Peren'nis, (daisy. w. & p. Ap. 4) leaves obovate, crenate; scape naked, 1 flowered.

1-2. BLITUM. (A Greek name.)

Capita'tum, (strawberry blite. O. r. J. ☉) heads in a terminal spike, not intermixed with leaves; leaves triangular, toothed. 15. i.

5-1. BORAGO.

Officina'lis, (borage. b. Ju. ☉) leaves serrate; calyx spreading.

14-2. BRASSICA.

Exotic.

Rapa, (turnip. ♂) root caulescent, orbicular, depressed, fleshy; radical leaves rough; cauline ones very entire, smooth. Var. *nita-baga*, has a turbinata, sub-fusiform root.

Olea'cea, (common cabbage, including all the varieties caused by culture. ♂) root caulescent, terete, fleshy; leaves smooth, glaucous, repand lobate.

12-13. CALTHA. (Latin name for Marygold.)

Palus'tris, (O. y. Ap. 4) stem erect; leaves cordate, sub-orbicular acute-crenate.

5-1. CAMPANULA. (Latin name, meaning a small bell.)

Rotundifo'lia, (flax bell-flower, hare-bell. O. b. J. 4) glabrous; radical leaves heart reniform, crenate; cauline ones linear, entire; panicle lax, few flowered; flowers nodding.

American'a, (E. b. Au. 4) leaves ovate lanceolate, long acuminate, lower ones sub-cordate with the petioles ciliate; flowers axillary

nearly sessile, in a terminal leafy raceme; corolla sub-rotate; style exsert. Cultivated. 2. f.

20—5. CANNABIS

Exotic.

Fati'va, (hemp. G. Au. ☉) stem pilose; leaves petioled, digitate; leaflets lanceolate, serrate, pilose; staminate flowers solitary axillary, pistillate ones spiked. 4—10. f.

5—1. CAPSICUM. (From Greek *Kapto*, to bite.)

Exotic.

An'nuum, (guinea pepper, red pepper, cayenne pepper. y-g. w Au ☉) stem herbaceous; peduncles solitary. From South America 10—18. i.

17—1. CARDUUS.

Pectina'tus, (comb-tooth thistle. E. p. ☿) unarmed; leaves decurrent lanceolate, pectinately pinnatifid; peduncles almost terminal, leafless, very long, about 1-flowered; flowers nodding, often discharging the pollen; scales of the calyx linear spreading.

19—3. CAREX. (From the Latin *careo*, to want.)

Ster'ilis, (barren sedge. O. M. ♀) spikelets in fives, sessile, approximate; fruit ovate, acuminate or somewhat beaked, 2-cleft, 3-sided compressed, scabrous at the margin; equalling the obovate acutish scale. 8. i. Wet.

10—1. CASSIA. (A Latin name.)

Mari'land'ica, (wild senna. O. y. Au. ♀) somewhat glabrous; leaves in 8 pairs, lance-oblong, mucronate; flowers in axillary racemes, and in terminal panicles; legumes linear, curved. River alluvion. 2—4. f.

Chama'cris't'a, (cassia, partridge pea. E. y. Au. ☉) somewhat glabrous; leaves linear, in many pairs, the glands of the petioles subpedicelled; two of the petals spotted; legumes pubescent. A most elegant plant. 8—16. i. Dry sand, &c.

19—12. CASTANEA. (From *Castana*, name of an ancient City.)

America'na, (chestnut. O. g. J. ♀) leaves lance-oblong, sinuate serrate, with the serratures mucronate, glabrous both sides. Large tree.

2—1. CATALPA. (An Indian name.)

Cordi'fo'lia, (M. w. & y. ♀) leaves simple, cordate, entire, by threes; flowers in panicles. 40—50. f. Grows wild in the Southern States, but with us is an exotic.

5—1. CELASTRUS.

Sean'dens, (false bittersweet, staff tree. O. y. w. J. ♀) stem twining, leaves oblong, acuminate, serrate; racemes terminal. Retains its scarlet berries through the winter.

4—1. CEPHALANTHUS.

occident'a'lis, (burton bush. O. w. Ju. ♀) leaves opposite and in threes, oval, acuminate. Inflorescence a round head. Swamps. Var. *pubescens*, has the leaves and branchlets pubescent. 4—5. f.

14—2. CHEIRANTHUS. (From the Greek *cheir*, a hand, and *anthos*, a flower.)

Exotic.

Chei'ri, (wall flower. J. ♀) leaves lanceolate, acute, glabrous; branches angled; stem somewhat of a woody texture.

An'nuus, (stock-july-flower. Ju. ☉) leaves lanceolate, sub-dentate obtuse, hoary; silique cylindrical, with an acute apex.

10—1. CHIMAPHILA. (From *cheima*, winter, and *philos*, a lover.) *Umbella'ta*, (prince's pine, bitter winter-green. O. r. w. Ju. ♀) leaves serrate, uniformly green, wedge-lanceolate, with an acute base; scape corymbed; filaments glabrous.

2—1. CHIONANTHUS. (From *chion*, snow, and *anthos*, a flower.)

Virgin'ica, (fringe tree, w. M. ♀) panicle terminal, trifid; peduncles 3-flowered; leaves acute. Var. *montanus*, leaves oval lanceolate, coriaceous, glabrous; panicle dense; drupe oval. Var. *maritimus*, leaves ovate-lanceolate, membranaceous, pubescent; panicle very lax; drupe eleiptic. Berries purplish-blue.

17—2. CHRYSANTHEMUM. (From *chrysos*, gold, and *anthos*, a flower.)

Leuca'n'themum, (ox-eyed daisy. O. J. ♀) leaves clasping, lanceolate, serrate, cut-toothed at the base; stem erect, branching. 12—20. i.

Exotic.

Parthe'nium, (feverfew) leaves petioled, compound, flat; leaflets ovate, gashed; peduncles branching, corymbed; stem erect.

2—1. CIRCAEA. (From *Circe*, name of an enchantress.)

Lute'ia'na, (enchanter's night-shade. O. Aug. r—w. ♀) stem erect; leaves ovate, remotely toothed, opaque, nearly smooth. 1—2. f.

12—13. CLEMATIS. (From *Klema*, a tendril.)

Virgin'ica, (virgin's bower. O. w. Ju. ♀) climbing; leaves ternate; leaflets ovate, sub-cordate, gash-toothed and lobate, flowers paniced, diœcious. 15—20. f.

19—3. COMPTONIA. (Named from Bishop Compton.)

Asplenifo'lia, (sweet-fern. O. g. Ap. ♀) leaves long-linear, alternately crenate-pinnatifid. 18—48. f.

5—1. CONVULVULUS. (From *convolvere*, to entwine.)

te'pens, (field bind-weed. O. w. & r. J. ♀) twining; leaves sagittate with the apex acute and the lobes truncate, entire (some obtuse;) bracts acute, longer than the calyx, and shorter than the middle of the corolla; peduncle angled, exceeding the petiole

Exotic.

Purpureus, (common morning glory. b. p. J. ☉) pubescent; leaves cordate, entire; peduncles 2 to 5 flowered; pedicels nodding, thick ened; divisions of the calyx lanceolate; capsules glabrous. Cultivated.

4—1. CORNUS. (From *Cornu*, horn.)

Canadensis, (dogweed, low-cornel. O. w. M. ♀) herbaceous; leaves at the top, whorled, veiny, involucre ovate, acuminate; fruit globose. 4—8. i.

Florida, (false box, dogwood tree, w. y. M. ♀) leaves ovate, acuminate; involucre 4, very large, somewhat obcordate; fruit ovate 15—30. f.

11—5. CRATÆGUS. (From *kratos*, tough.)

Coccinea, (thorn-bush. O. w. M. ♀) thorny; leaves long petioled, ovate, acutely-lobed, serrate, glabrous; petioles and pubescent calyx glandular; flowers pentagynous. Var. *viridis*, has lanceolate leaves, sub-trilobate; stem unarmed.

3—1. CROCUS.

Officinalis, (saffron. y. ♀) leaves linear, with revolute margins, stigma exsert, with long-linear segments. Var. *sativus*, having violet corollas

19—16. CUCUMIS.

Exotic.

Sativus, (cucumber. y. Ju. ☉) angles of the leaves straight; pomaceous berry oblong, scabrous. Brought from Asia.

19—16. CUCURBITA. (Latin word for gourd.)

Exotic.

Pepo, (pumpkin. y. Ju. ☉) leaves cordate obtuse, sub 5-lobed, denticulate; pomaceous berry roundish or oblong, smooth. Var. *patrio*, has the fruit more or less flattened. From Asia.

Citrullus, (watermelon. y. Au. ☉) leaves 3-lobed; the lobes sinuate pinnatifid, obtuse; pomaceous berry oval, smooth. Fruit watery often striped. From Africa and the south of Asia.

17—1. CYNARA.

Exotic.

Scolymus, (garden artichoke. O. p. Ju. ♂) very soft-pubescent; leaves broad lanceolate, sessile; paniced racemes.

CYNOGLOSSUM. (From *kuon*, a dog, and *glossa*, tongue.)

Officinale, (hound's-tongue. O. p. Ju. ♂) very soft-pubescent; leaves broad, lanceolate, sessile; paniced racemes.

18—2. CYPRIPIEDIUM. (From *Kupris*, name of Venus, and *podion*, a slipper.)

Pubescens (yellow lady's slipper. y. M. ♀) stem leafy; lobe of the

style oval-cordate, obtuse; outer petals broad-oval, obtuse; longer than the petals, split before.

8—2. DACTYLIS. (From *daktulos*, a finger.)

Glomerata (orchard grass. E. J. ♀) panicle glomerate; leaves carnate. 2—3. f.

5—1. DATURA.

Stramonium, (thorn apple. O. w-b. Au. ☉) pericarps spinose, erect, ovate; leaves ovate, glabrous, angular-dentate.

5—2. DAUCUS.

Carota, (carrot. w. J. ♂) seeds hispid; petioles nerved underside; divisions of the leaflets narrow-linear, acute. 2—3. f.

12—2. DELPHINIUM. (From *Delphis*, a dolphin.)*Exotic.*

Consolidum, (larkspur. b. Ju. ☉) nectaries 1-leaved; stem subdivided. Naturalized.

10—2. DIANTHUS. (From *Dios*, Jupiter, and *anthos*, a flower.)

Armeria, (wild pink. r. Ju. ☉) flowers aggregate, fascicled; scales of the calyx lanceolate, villose, equalling the tube. 1. f.

Exotic.

Barbatus, (sweet-william. r. & w. Ju. ♀) flowers fascicled; scales of the calyx ovate-subulate, equalling the tube; leaves lanceolate.

Caryophyllus, (carnation or pink. r. & w. ♀) flowers solitary; scales of the calyx sub-rhomboid, very short; petals crenate, beardless; leaves linear-subulate, channelled. By rich culture the stamens change to petals.*

10—1. EPIGÆA. (From *Epi*, upon, and *ge*, the earth.)

Repens, (trailing arbutus. O. r. & w. Ap. ♀) stem creeping; branches and petioles very hirsute; leaves cordate-ovate, entire; corolla cylindrical.

15—5. ERODIUM. (From *Erodios*, a heron.)*Exotic.*

Ciconium, (storkbill geranium. ☉) peduncled many-flowered; leaves pinnate; leaflets pinnatifid, toothed; petals oblong, obtuse; stem ascending.

6—1. ERYTHRONIUM. (From *Eruthros*, red.)

Americana, (dog tooth violet, adder's tongue. O. y. Ap. ♀) leaves

* The carnation differs from the common pink only on account of a peculiar mode of culture.

lance-oval, punctate; petals oblong lanceolate, obtuse at the point, inner ones 2-dentate near the base; style clavate; stigma entire (stigma 3.) 6—8. i.

17—1. EUPATORIUM. (From *Eupator*, a king of Pontus.)

Perfoliatum, (boneset, thorough-wort, O. w. Au. 2) leaves connate perfoliate, oblong serrate, rugose, downy beneath; stem villose. 2. f.

11—13. FRAGARIA. (From *Fragans*, sweet smelling.)

Virginiana, (wild strawberry, O. w. M. 2) calyx of the fruits spreading; hairs on the petioles erect, on the peduncles close pressed; leaves somewhat glabrous above

6—1. FRITILLARIA. (From *Fritillus*, a dice box.)

Exotic.

Imperialis, (crown imperial, r. & y. M. 2) flowers under a leafy crown, nodding; leaves lance-linear, entire. From Persia.

6—1. GALANTHUS. (From *Gala*, milk, and *anthos*, a flower.)

Nivalis, (snow drop, w. Ap. 2) leaves linear, keeled, acute, radical; scape 1-flowered.

5—2. GENTIANA. (From *Gentius*, a king of Illyria.)

Crinita, (fringed gentian, O. b. S. 2) stem terete; branches long, 1-flowered; leaves lanceolate, acute; corolla 4-cleft; divisions obovate, 3-h ciliate. 18. i.

15—10. GERANIUM. (From *Geranos*, a stork.)

Maculatum, (crow foot or wild geranium, O. r. & b. J. 2) erect; pubescence reversed; stem dichotomous; leaves opposite, 3 or 5-parted, gashed; upper ones sessile; peduncles 2-flowered; petals obovate. 1—2. f.

Exotic.

Sanguineum, (bloody geranium, 2) peduncle 1-flowered leaves 5-parted, 3-cleft, orbicular; capsule bristly at the top.

13—2. GERARDIA. (From *Gerarde*, an ancient botanist.)

Flowers yellow.

Flava, (False foxglove, O. y. Ju. 2) pubescent; stem nearly simple, leaves sub-sessile, lanceolate, entire or toothed; lower ones sub-pinnatifid, gashed; flowers axillary, opposite, sub-sessile. 2—3. f.

13—1. GLECHOMA. (A Greek name.)

Hederacea, (ground ivy, gill-overground, O. b. & r. M. 2) leaves reniform crenate; stem rooting. Var. *cordata*, leaves cordate.

17—2. GNAPHALIUM. (A Greek name.)

Margaritaceum, (large flower, life-everlasting, O. y. & w. Ju. 2) leaves linear-lanceolate, gradually narrowing, acute; stem branching above; corymb fastigiate; flowers pedicelled. Flowers with white pearly rays and yellow disks. 1—2. f.

13—1. HEDEOMA.

Pulegioides, (pennyroyal, O. b. J. 2) pubescent; leaves oblong, serrate; peduncles axillary, whorled. 6—8. i.

17—3. HELIANTHUS. (From *Elios*, the sun, and *anthos*, flower.)

Exotic.

Annuus, (common sunflower, y. & w. Ju. 2) leaves al. cordate, 3-nerved; peduncles thickening upwards; flowers nodding. 6—10. f.

12—13. HEPATICA. (From *Hepar*, the liver.)

Acutiloba, (heart-liverleaf, O. w. & b. Ap. 2) leaves cordate, 3 to 5-lobed; lobes entire, acute; leaves of the calyx acute. Grows in woods, preferring the north side of hills and mountains. 5. i.

Americana, (kidney-liverleaf, O. w. & b. Ap. 2) leaves heart-reniform, 3-lobed; lobes entire, round-obtuse; leaves of the calyx obtuse. Grows chiefly in the woods, preferring the south side of hills and mountains. This is sometimes called the *triloba*. 5. i.

1—1. HIPPURIS. (From *ippos*, a horse, and *oura*, tail.)

Fulgaris, (mare's-tail, y-g, M. 2) leaves linear, and lance linear, venicillate.

4—1. HOUSTONIA. (From *Houston*, a botanist.)

Sericea, (innocence, forget-me-not, O. b. & w. M. 2) stem erect, sericeous, dichotomous; radical leaves spatulate; cauline ones oblanceolate, opposite; peduncles 1-flowered, elongated. 4—6. i. Very common in New England.

20—5. HUMULUS.

Lupulus, (hop, O. g-y. Au. 2) stem twining with the sun; leaves lobed. (R)

10—2. HYDRANGEA. (From *Hudor*, water, and *angeion*, a vessel.)

Fulgaris, (hydrangea, E. w. Au. 2) leaves oblong-ovate, obtuse at the base, acuminate, glabrous beneath; cymes naked. 5. f.

12—5. HYPERICUM.

Perforatum, (O. y. J. 2) erect, branching; stem 2-edged; leaves oblong, obtuse, transparently punctate; panicle terminal-brachiately leafy; petals twice as long as the acute, lanceolate calyx. This is the common St. John's wort, so troublesome to farmers. 1—3. f.

5-1 IMPATIENS. (Signifying *impatiens*, from the elastic capsule.)

Pal' lida, (jewel-weed, touch-me-not. O. y. Ju. ☉) peduncles solitary, 2 and 4-flowered; nectary obtusely conic, dilated, shorter than the petals; spur recurved, very short; flowers sparingly punctate, leaves rhomb-ovate, mucronate-toothed. 2-4. f.

Ful'va, has the corollas with crowded spots.

Exotic.

Bal'samina, (garden lady's slipper) peduncles aggregate, 1-flowered, leaves lanceolate, upper ones alternate; hooded petal (or nectary) shorter than the other petals; colour various.

3-1. IRIS. (From *Iris*, the rainbow.)

Versic'olor, (O. b. J. ♀) leaves ensiform; stem acute on one side; capsules oblong, 3-sided, with obtuse angles. 2-3. f.

Exotic.

Plica'ta, (garden iris. p. w. M. ♀) bearded; stem many flowered higher than the leaves; petals undulate-plicate, erect ones broadest. 18-24. i.

Pu'mila, (dwarf-flower-de-luce. b. M. ♀) bearded; scape 1-flowered; leaves ensiform, glabrous; tube of the corolla exsert; petals oblong, obtuse. 6-10. i.

3-9. IXIA. (From *Ixia*, birdlime.)

Chinen'sis, (blackberry-lily. y. r. J. ♀) corolla about 6 petaled; stem flexuous; leaves ensiform.

2-1. JASMINUM. (From *Ion*, violet, and *osme*, odour.)

Fru'ticans, (jasmine. y. ♀) leaves alternate, ternate, simple; leaflets obovate, wedge-form, obtuse; branches angled.

10-1. KALMIA. (From *Kalm*, a botanist.)

Laur'olia, (laurel. E. w. & r. Ju. ♀) leaves long petioled, scattered, and in threes, oval, smooth both sides; corymbs terminal, with viscid hairs. 3-20. f.

Angustifo'lia, (sheep laurel. O. J. ♀) leaves in threes, petioled, oblong, obtuse, sometimes rusty beneath; corymbs lateral; bracts linear; peduncles and calyx with glandular hairs. *Var. ovata*, taller, leaves broader, sub-ovate. 2-3. f.

17-1. LACTUCA. (From *Lac*, milk.)

Exotic.

Sati'va, (lettuce. y. Ju. ☉) leaves roundish; cauline ones cordate, stem corymbed. *Var. romana*, has oblong, straight leaves, narrowed at the base. *Var. laciniata*, has the lower leaves pinnatifid, and the upper ones runcinate.

16-10. LATHYRUS. (A Greek name.)

Exotic.

Odora'tus, (sweet pea. J. ☉) peduncles 2-flowered; tendril with 2-ovate oblong leaflets; legumes hirsute.

9-1. LAURUS.

Sas'safras, (sassafras tree. O. y. M. ♀) leaves entire and lobed on the same plant; flowers mostly dioecious. 10-25. f.

13-1. LAVANDULA. (From *Lavare*, to wash.)

Exotic.

Sp'ica, (lavender. Au. ♀) leaves sessile, lance linear, with revolute margins; spike interruptedly naked.

17-1. LEONTODON. (From *Leon*, a lion, and *odous*, a tooth, in allusion to its leaf.)

Torax'acum, (dandelion. O. y. Ap. ♀) outer calyx reflexed; scape 1-flowered, leaves runcinate, with toothed divisions. Introduced.

6-1. LILIUM.

Philadel'phicum, (red lily. O. r. y. J. ♀) leaves whorled, lance linear; corolla erect, bell-form, spreading; petals lanceolate, having claws. 1-3. f.

Exotic.

Can'didum, (white lily. w. J. ♀) leaves lanceolate, scattered, tapering to the base; corolla bell-form, glabrous within.

Bul'biferum, (orange lily. y. J. ♀) leaves scattered, 3-nerved; corolla campanulate, erect, scabrous within.

5-5. LINUM.

Exotic.

Usitatis'simum, (flax. b. Ju. ☉) leaflets of the calyx, acute, 3-nerved, petals crenate; leaves lanceolate, alternate; stem sub-solitary.

5-1. LOBELIA. (From *Lobel*, a botanist.)

Cardina'lis, (cardinal flower. O. r. Ju. ♀) erect, simple, pubescent; leaves lance-ovate, acuminate, denticulate; racemes somewhat one sided, many flowered; stamens longer than corollas. Damp. 1-2. f.

Infla'ta, (wild tobacco. O. b. Ju. ☉) erect, branching, very hirsute; leaves ovate, serrate; racemes leafy; capsules inflated. 12-15. i.

5-1. LONICERA. (From *Lonicer*, a botanist.)

Sempervi'rens, (E. r. y. M. ♀) spikes with distant, nakedish whorls; corollas sub-equal; tube ventricose above; leaves ovate, and obovate, glaucous beneath; upper ones connate perfoliate. Leaves perennial.

Exotic.

Capri'folium, (honeysuckle. ♀) corollas ringent-like, terminal; sessile leaves connate perfoliate at the top.

14-1. LUNARIA. (From *Luna*, the moon.)

Exotic.

Redwi'va, (satin flower. b-p. 2) leaves with mucronate teeth; siliques tapering to both ends. Flowers odorous.

16-10. LUPINUS. (A Latin name.)

Peren'nis, (wild lupine. O. b. M. 2) stem and leaves smoothish; leaves digitate, with about 8 to 10 leaflets, which are oblanceolate, obtusish; calyxes alternate, not appendaged; banner emarginate, kee. entire. 12-18. i.

4-1. LYCIUM. (From *Lycia*, a country of Asia.)

Exotic.

Barba'rum, (matrimony vine. J. r. y. 2) stem angled; branches erect, leaves lanceolate, tapering to both ends; calyx mostly 3-cleft.

5-1. LYSIMACHIA. (From *Lysimachus*, an ancient king.)

Stric'ta, (loose strife. O. y. Ju. 2) raceme terminal, very long, lax, leaves opposite, lanceolate, sessile; petals lanceolate, spreading. 1-2. f.

15-13. MALVA.

Rotunda'folia, (low-mallows. O. r. w. J. 2) leaves heart-orbicular, obsoletely 5-lobed; peduncles bearing the fruit declined; stem prostrate. Very common.

Exotic.

Sylves'tris, (mallows. r-b. I. 2 and 2) stem erect; leaves about 7-lobed, acutish; peduncles and petioles hairy.

13-1. MENTHA.

Exotic.

Piperi'ta, (peppermint. p. Au. 2) spikes obtuse, interrupted below; leaves sub-ovate, somewhat glabrous, petioled; stem glabrous at the base. Naturalized. 1-2. f.

Viri'dis, (spear mint. p. Au.) leaves lanceolate, sessile; spikes elongated, interrupted; stamens long. 1-2. f.

5-1. MIRABILIS. (In Latin, *admirable*.)

Exotic.

Jal'apa, (four o'clock. r. y. Ju. 2) flowers heaped, peduncled; leaves glabrous.

2-1. MONARDA. (From *Monardes*, a Spanish physician.)

Vid'yna, (mountain mint. O. r. J. 2) leaves ovate, acuminate, subcordate, somewhat hairy; flowers in simple or profliferous heads, outer bracts large, coloured, lanceolate. Var. *angustifolia*, leaves lance-ovate, acuminate, pubescent; stem pubescent. 18-24 i.

10-1. MONOTROPA. (From *monos*, single, and *trepo*, to turn.)

Inflo'ra, (bird's nest, Indian pipe. C. w. J. 2) stem 1-flowered flower nodding at first, at length erect; scales of the stem approximate. Whole plant ivory white at first. 4-8. i.

19-4. 1. ORUS. 53.

Exotic.

A'ba, (white mulberry. M. 2) leaves heart-form, with oblique bases, ovate or lobed, unequally serrate, smoothish. From China and Persia. Naturalized. 15-20. f.

13-1. NEPETA. (From *Nepes*, a town of Tuscany.)

Cata'ria, (catmint, catnep. O. b-w. 2) hoary pubescent; flowers in whorled spikes; leaves petioled, cordate tooth serrate.

8-1. GENOTHERA. (From *genos*, wine, and *thera*, a beast.)

Capsules elongated sessile.

Even'nis, (scabish, evening primrose. O. y. J. 2) stem villose, scabrous; leaves lance-ovate, flat-toothed; flowers sub-spiked, sessile; stamens shorter than the corolla. 3-5. f.

18-1. ORCHIS

Spectabi'lis, (O. r. M. 2) lip obovate, undivided, crenate, retuse, petals straight; lateral ones longest; spur clavate, shorter than the germ; bracts longer than the flowers; stem leafless. 3-6. i.

12-3. PÆONIA. (From *Pæon*, an ancient Physician.)

Officina'lis, (peony, r. J. 2) leaves decomposed; leaflets lobed, lobes broad-lanceolate, capsules downy.

12-1. PAPAVER. (Old Latin name.)

Exotic.

Somnif'erum, (opium poppy. J. 2) calyx and capsule glabrous; leaf clasping, gashed, glaucous.

15-7. PELARGONIUM. (From *Pelargos*, a stork.)

Exotic.

1. *Nearly stemless; root tuberous.*

Triste, (mourning geranium,) umbel simple; leaves rough-haired, pinnate, leaflets bipinnatifid; divisions oblong acute. Flowers dark green.

2. *Leaves simple, not angled.*

Odoratis'simum, (sweet scented geranium. 2) peduncles sub-5-flowered; leaves round cordate very soft.

3. *Leaves simple, more or less angled, or lobed.*

Zonale, (horse shoe geranium. 2) umbels many-flowered; leaves heart

orbicular, obsolete lobed, toothed, with a coloured zone or band around near the margin.

Quercifolium, (oak-leaf geranium n. ♀) umbels sub-many-flowered; leaves cordate, pinnatifid crenate; sinuses rounded; filaments ascending at the apex.

13—2. PENTSTEMON. (From *Pente*, 5, and *stemon*, a stamen.) *ubercens*, (beard tongue. O. w. p. J. ♀) stem hairy; leaves serrulate, lance-oblong, sessile; flowers panicled; the barren filament bearded from the apex to below the middle.

3—2. PHALARIS. (From *Phalos*, shining.)

Americana, (ribbon grass, wild canary grass. E. Ju. ♀) panicle oblong, spiked; glumes of the calyx boat-shaped, serrulate; corolla unequal; rudiments hairy. Var. *pista*, leaves variously striped. This variety is the ribbon grass of the gardens 2—5. f.

16—10. PHASEOLUS. (From *Phaseolus*, a little boat, from the shape of its pod.)

Exotic.

Vulgaris, (common pole bean. p. w. Ju. ☉) stem twining; raceme solitary, shorter than the leaves; peduncles in pairs; bracts smaller than the calyx, spreading; legumes pendulous. From the East Indies.

Nanus, (bush bean, six weeks bean. ☉) stem erect, smooth; bracts larger than the calyx; legumes pendulous, compressed, rugose. Seeds variously coloured.

11—1. PHILADELPHUS. (From *philo*, to love, and *adelphos*, a brother.)

Exotic.

Coronarius, (mock orange, false syringa. w. J. ♀) styles distinct; leaves ovate, sub-dentate.

3—2. PHLEUM.

Pratense, (timothy grass. O. J. ♀ and ♂) spike cylindric, calyx mucronate awned; keel ciliate; awn shorter than the calyx; culm erect. Introduced. 2—3. f.

5—1. PHLOX. (From *Phlox*, a flame.)

Paniculata, (smooth-stem lichnidia, r. w. Ju. ♀) glabrous erect, leaves lanceolate, narrowing gradually flat; margins rough; corymbs panicled, divisions of the corolla rounded; calyx awned. Cultivated. 2—3. f.

10—10. PHYTOLACCA (From *Phutor*, a plant, and *Lacca*, gum.)

Decandera, (poke-weed. O. w. Ju. ♀) leaves ovate, acute at both ends; flowers racemed; berries flattened at the ends. 3—6. f.

19—16. PINUS.

Leaves solitary with separate bases.

Canadensis, (hemlock tree. O. M. ♀) leaves flat; denticulate, 2-ranked;

strobiles ovate, terminal, scarcely longer than the leaves. The bark is used in tanning leather.

16 10. PISUM.

Exotic.

Sativum, (pea. p. w. J. ☉) petioles terete; stipules round and crenate at the base; peduncles many-flowered. Var. *umbellatum*, (boquet pea,) has the stipules 4-cleft acute. Var. *quadratum*, (quadrate pea,) fruit ash colour, 4-sided. Var. *humile*, (dwarf pea,) stem erect, not climbing; leaflets roundish.

3—2. POA.

Pratensis, (meadow grass. O. J. ♀) panicle diffuse; upper leaves much shorter than the smooth sheaths; florets acute, 5 nerved, webbed at the base; stipule short truncate; root creeping. 2—3. f.

12—1. PODOPHYLLUM. (From *pous*, a foot, and *phylon*, a leaf.)

Peltatum, (wild mandrake, may-apple. O. w. M. ♀) stem terminated with 2 peltate palmate leaves; flower single, inserted in the fork, formed by the petioles of the leaves. Sometimes the plant is three leaved, and sometimes the flower is inserted on the side of one of the petioles. 1—2. f.

16—6. POLYGALA. (From *polus*, much, and *gala*, milk.)

Paucifolia, (flowering wintergreen. O. r. M. ♀) small, large flowered; stem simple, erect, naked below; leaves ovate, acute, glabrous near the top of the stem; flowers crested, terminal, about in threes. 3—4. i.

20—8. POPULUS.

Exotic.

Dilatata, (lombardy poplar, Italian poplar, Ap. ♀) leaves glabrous both sides, acuminate serrate, deltoid, the breadth equal to, or exceeding the length; branches erect, close to the stem.

11—13. POTENTILLA. (From *potentia*, power.)

Leaves digitate in fives, rarely in sevens.

Canadensis, (common five finger. O. y. M. ♀) procumbent, sub-ramose, whitish silky; stipules ovate, gashed; leaves wedge obovate, gash toothed; stem ascending, and creeping hirsute; peduncles solitary, elongated; divisions of the calyx lance-linear, petals orbicular, sub-entire, of the length of the calyx.

13—1. PRUNELLA.

Vulgaris, var. *pennsylvanica*, (heal-all, self-heal. O. J. ♀) leaves petioled, oblong-ovate, toothed at the base; lips of the calyx unequal; upper one truncate, awned; stem ascending. 6—12. i.

12-1. PRUNUS.

Flowers in racemes.

Virginia'na, (wild cherry, rum cherry, cabinet cherry. O. w. M. h) racemes erect, elongated; leaves ova-oblong, acuminate, unequally serrate, glabrous both sides; petioles generally bearing 4 glands. In open fields the limbs of this tree spread out into an elegant oval top; but in dense forests it grows to a very great height, with a few contracted branches.

Exotic.

Cer'asus, (garden cherry. w. r. h) umbel sub-petioled; leaf lance-ovate, glabrous, conduplicate.

Domes'tica, (plum. w. M. h) peduncles sub-solitary; leaves lance-ovate, convolute; branches thornless.

10-1. PYROLA. (From *pyrus*, a pear, from the form of its leaf.)

Rotundi'folia, (shin leaf, pear leaf, wintergreen. O. w. J. h) style declined; leaves rounded, or broad oval, obsolete serrulate, sub-coriaceous, shining; petiole about as long as the lamina; scape many flowered. 6-12. i.

11-5. PYRUS.

Exotic.

Communi's, (pear. E. w. r. M. h) leaves ovate, serrate, (rarely entire); peduncles corymbed.

Mal'us, (apple. E. w. r. M. h) flowers in sessile umbels; leaves ovate-oblong, acuminate, serrate, glabrous; claws of the petals shorter than the calyx; styles glabrous. Var. *sylvestris*, (wild apple,) leaves ovate serrate; fruit small, austere.

19-12. QUERCUS.

Alba, (white oak. O. M. h) leaves oblong, sinuate pinnatifid, pubescent beneath; lobes obtuse, entire, narrowed at their bases, particularly on full grown trees; fruit peduncled; calyx somewhat bowl form, tubercled, flattened at the base; acorn ovate. The most useful timber in America. 70-80. f.

12-13. RANUNCULUS. (From *rana*, a frog.)

A'cris, (crow foot, butter cup. O. y. M. h) hairs close pressed, leaves 3-parted; many-cleft; upper ones linear; peduncles terete; calyx spreading. 1-2. f.

14-2. RAPHANUS. 39. 63.

Exotic.

Sati'vus, (garden radish. w. J. h) leaves lyrate; silique terete; to-rose, 2-celled. There are several varieties of this species—one has a fusiform, another a globose, another a black root.

5-1. RIBES.

Triflo'rum, (wild gooseberry. A. g. M. h) spine sub-axillary; leaves glabrous, 3-5-lobed, gash-toothed; peduncles sub 3-flowered, with

the pedicels elongated; bracts very short; petals spatulate, undulate; style hirsute, half 2 or 3-cleft, exsert; berry glabrous. Berries pale red. 3-4. f.

Exotic.

Au'brum, (currant. g. M. h) unarmed; racemes glabrous, nodding; corolla flat; petals obcordate; leaves obtusely 5-lobed; stem erect. Berries red. 2-4. f.

19-15. RICINUS.

Communi's, (castor-oil plant. h) leaves peltate, palmate; lobes lanceolate, serrate; stem with hoary mealiness. 4-6. f.

16-10. ROBINIA. (From *Robin*, a French botanist.)

Pseudo-acacia, (locust tree, false acacia. A. w. M. h) leaves pinnate with a terminal leaflet; stipules thorny, or a thorn; racemes pendant; teeth of the calyx unawned; legumes smooth. 30-40. f.

11-13. ROSA.

Rubigin'osa, (sweet briar. r. J. h) germ ovate; peduncles and petioles glandular hispid; petioles somewhat prickly; stem glabrous; prickles scattered, hooked slender; leaflets (5 or 7) ovate, serrate, sub-glandular beneath. 3-4. f.

Exotic.

Damasce'na, (damask rose. w. r. J. h) calyx half pinnate; germ ovate, turgid, (thickened near its top,) bristly; stem and petioles prickly. leaflets ovate, pointed, downy beneath.

Musco'sa, (moss rose. r. Au. h) germs ovate; calyx, peduncles, petioles, and branches hispid glandular viscid, (moss-like;) spines of the branches scattered, straight.

Cinnamo'mea, (cinnamon rose. h) germs globose; germs and peduncles glabrous; stem with stipular prickles; petioles somewhat unarmed; leaflets oblong. Stem brown cinnamon colour.

11-13. RUBUS.

Oleus, (garden raspberry. w. M. h) leaves quinate-pinnate, and ternate; leaflets rhomb-ovate, acuminate, downy beneath; petioles channelled; stem prickly, hispid flowers sub-panicled. Var. *americanus*. branchlets nearly glabrous; stem and petioles terete; leaves alternate; pedicels somewhat prickly. 4-6. f.

Odgra'tus, (flowering raspberry. r. J. h) unarmed, erect, viscid, hispid; leaves simple, acutely 3 or 5-lobed; corymb terminal, spreading. Flowers large; berries rather dry and thin. 3-6. f.

10-1. RUTA.

Exotic.

Grave'olens, (rue,) leaves more than decomposed; leaflets oblong, minimal ones obovate; petals entire.

19-12. SAGITTARIA. (From *sagitta*, an arrow.)

Sagitti'folia, (arrow head. O. w. Ju. h) leaves lanceolate acute, sagittate; lobes lanceolate acute, straight. 1-2. f.

1—1. SALICORNIA. (From an old French word, *saïcour*;
Herba'cea, (samphire, glasswort. L. Au. ☉) herbaceous, spreading
joints compressed at the apex, emarginate bifid. Var. *virginica*, has
the branches undivided, and the jointed spikes very long. The
fructification is very obscure; but it may be known by its leafless
nearly cylindric jointed branches. It grows in salt marshes along
the sea-board, and at Onondaga salt springs. 12—18. i.

20—2. SALIX.

Babyloni'ca, (weeping willow. M. ♀) branchlets pendant; leaves lance-
olate, acuminate, serrate glabrous, upper and lower sides of different
colours; stipules roundish, contracted; aments flower at leafing
time; germs sessile, ovate, glabrous. Supposed to be the willow on
which the Israelites hung their harps, when captive in Babylon. In-
troduced.

2—1. SALVIA. (From *salvo*, to save.)

Exotic.

Officina'lis, (sage. b. J. ♀ or ♀) leaves lance-ovate, crenulate; whorls
few-flowered; calyx mucronate.

5—3. SAMBUCUS.

Canaden'sis, (black-berried-elder. O. w. J. ♀) branchlets and petioles
glabrous; leaflets about in 4 pairs, oblong-oval, glabrous, shining,
acuminate; cyme lax, divided into about 5 parts. 8—15. f.

13—1. SANGUINARIA. (From *sanguis*, blood.)

Canaden'sis, (blood-root. O. w. Ap. ♀) leaves sub-reniform, sinuate-
lobed; scape 1-flowered. A variety, has linear petals. 6—10. i.

10—2. SAPONARIA. (From *sapo*, soap.)

Exotic.

Officina'lis, (soapwort, bouncing bet. w. J. ♀) calyx cylindric; leaves
lance-ovate, opposite sub-connate, entire. Probably introduced, and
naturalized. 10—18. i.

10—2. SAXIFRAGA. (From *saxum*, a stone, and *frango*, to
break.)

Sarmentosa, (beef-stalk geranium. w. Au. ♀) leaves roundish, tooth-
ed, hairy; sending off creeping shoots; 2 petals in each flower
longer.

13—1. SCUTELLARIA. (From *scutella*, a shield.)

Lateriflo'ra, (mad-dog, skull-cap, hood-wort. O. b. Ju. ♀) branching
glabrous; leaves long-petioled, ovate, toothed; cauline ones sub-cor-
date; racemes lateral, leafy. Damp. 1—2. f.

3—2. SECALE.

Cereale, (rye. J. ♂) glumes and bristles scabrous-ciliate; corolla
smooth. Introduced.

10—3. SILENE. (From *Silenus*, a bacchanalian of ancient times.)

Pennsylvanica, (pink-catchfly. p. M. J. ♀) viscidly pubescent; radicle

leaves wedge-form; stem-leaves lanceolate; panicles trichotomous;
petals slightly emarginate, very obtuse, sub-crenate. 8—12. i.

14—2. SINAPIS.

Exotic.

Nigra, (common mustard. y. J. ☉) silique glabrous, 4-angled, close
pressed to the stem; leaves at the top lance-linear, entire, smooth.—
Naturalized.

15—3. SISYRINCHIUM. (From *sus*, a hog, and *runchion*, a snout.)

La'ceps, (blue-eyed grass. O. b. J. ♀) scape (or culm) simple, 2-edged
or 2-winged; glume-like, spathe of 2 unequal valves, extending
above the flower; petals mucronate. 6—12. i.

5—1. SOLANUM. (From *solor*, to comfort.)

Dulcam'ra, (bittersweet. E. p-b. Ju. ♀) stem unarmed, woody, climb-
ing; lower leaves mostly cordate, glabrous; upper ones mostly gut-
tar-hastate, few-flowered; corymbs opposite to the leaves.

Exotic.

Tuberosum, (potato. b. w. Ju. ♀) stem wing-angled, unarmed; leaves
interruptedly pinnate; leaflets entire; flowers sub-corymbed; roots
knobbed-tuberos. Cultivated.

17—2. SOLIDAGO. (From *solido*, to strengthen.)

Canaden'sis, (canadian golden-rod. O. y. Ju. ♀) stem downy; leaves
lanceolate, serrate, rough; racemes copious paniced, recurved; rays
hardly longer than the disk; stem angular; leaves sessile, three
inches long, sometimes nearly entire. 2—5. f.

Lateriflo'ra, (side-flowered golden rod. y. Au. ♀) stem erect, a little
hairy; leaves lanceolate, slightly 3-nerved, glabrous, rough-edged;
lower ones sub-serrate; racemes paniced, a little recurved; flowers
large, the rays being much longer than the calyx; stem striated,
often purplish, pinnatifid, with numerous lateral flowering branches.
2—3. f.

3—2. SORGHUM. (An Indian name.)

Exotic.

Saccharatum, (broom-corn. y. g. Au. ☉) panicle somewhat whorled,
spreading; seeds oval; glumes covered with permanent softish hairs;
leaves linear. From the East Indies. 6—8. f.

2—1. SYRINGA. (From a fabulous nymph, *Syrinx*, who was chang-
ed into a reed, or perhaps more probably from its Turkish name,
Srinx. The wood is used by the Turks for making pipe-stems.)

Vulgaris, (lilac. b-p. w. M. ♀) leaves cordate; flowers in a thyrse.
Persica, (persian lilac. f. M. ♀) leaves lanceolate, entire and pin-
natifid.

17—2. TAGETES. (From *Tages*, a fabulous deity of ancient times.)

Exotic.

Erecta, (african marigold. y. Ju. ☉) leaves pinnate; leaflets lanceo-

late, ciliate serrate; peduncles 1-flowered, incrassate; sub-inflated; calyx angled.

17—2. TANACETUM.

Exotic.

Vulga're, (tansey. y. Ju. ♀) leaves doubly pinnate, gash-serrate. Naturalized. Var. *crispum*, (double tansey,) leaves crisped and dense.

13—1. TEUCRIUM. (From *Teucer*, a Trojan prince.)

Canadense, (wood sage, germander. O. r. Ju. ♀) pubescent; leaves lance-ovate, serrate, petioled; stem erect; spikes whorled, crowded; bracts longer than the calyx. Var. *virginicum*, upper leaves sessile; bracts about the length of the calyx. 1—3. f.

13—1. THYMUS. (From *thumos*, force.)

Exotic.

Vulgaris, (thyme. b-p. J. ♀, ♀) erect; leaves ovate and linear, revolute; flowers in a whorled spike.

6—1. TRADESCANTIA. (From *Tradescant*, a botanist.)

Virginica, (spider wort. b-p. M. ♀) erect, branching; leaves lanceolate, elongated, glabrous; flowers sessile; umbel-compact pubescent. Cultivated. 1—2. f.

16—10. TRIFOLIUM. (From *tres*, 3, and *folium*, a leaf.)

Repens, (white clover. O. w. M. ♀) creeping; leaflets ovate-oblong, emarginate, serrulate; flower in umbelled heads; teeth of the calyx sub-equal; legumes 4-seeded.

Pratense, (red clover. O. r. M. ♀) ascending, smoothish, leaflet ovate, sub-entire; stipules awned; spikes dense-ovate; lower tooth of the calyx shorter than the tube of the corolla, and longer than the other teeth. 2—3. f.

6—3. TRILLIUM. (From *triliz*, triple.)

Ereticum, (false wake robin. O. p. w-y. ♀) peduncles erect or erectish with the flowers a little nodding; petals ovate, acuminate, spreading; equalling the calyx; leaves rhomboid, acuminate, sessile. Var. *albopurpureum*, petals large, dark purple. Var. *album*, petals smaller, white; germ red. Var. *flavum*, petals yellow; both petals and calyx leaves longer and narrower. 12 to 18 inches high. Leaves often 2 to 4 inches broad. Peduncles about 3 inches long. 9—16. f.

3—2. TRITICUM. (From *tero*, to beat or thresh.)

Exotic.

Huberianum, (winter wheat. J. ♂) calyx glume 4-flowered, tumid, even imbricate, abrupt, with a short compressed point; stipule jagged; corollas of the upper florets somewhat bearded. There are several varieties of this species which are introduced by culture.

8—1 TROPÆOLUM. (From *Tropæon*, a trophy.)

Exotic.

Majus, (nasturtium, indian cress. y. & r. Ju. ♂ & ♀) leaves peltate sub-repand; petals obtuse, some of them fringed.

6—1. TULIPA.

Exotic.

Gesneriana, common tulip. M. ♀) stem 1-flowered, glabrous; flower variously coloured, erect; petals obtuse, glabrous; leaves lance-ovate.

19—3. TYPHA.

Latifolia, (cat tail, reed mace. O. Ju. ♀) leaves linear, flat, slightly convex beneath; staminate and pistillate aments close together. Wet. 4—6. f.

10—1. VACCINIUM.

Rasinosum, (black whortleberry. O. p. M. ♀) leaves slender, petioled, oblong oval, mostly obtuse, entire, bedewed with resinous specks beneath; racemes lateral, 1-sided; pedicels short, somewhat bracted, corolla ovate conic, 5-cornered. Berries black. One variety has a yellowish green, and another has a reddish yellow corolla. 1—4. f.

5—1. VERBASCUM.

Thapsus, (mullein. O. y. J. ♂) leaves decurrent, downy both sides, stem generally simple, though sometimes branched above; flowers in cylindrical-spikes. 3—6. f.

2—1. VERONICA.

Officinalis, (speedwell. b. M. ♀) spikes lateral, peduncled; leaves opposite, obovate, hairy, stem procumbent, rough haired. 9—12. f.

5—3. VIBURNUM.

Acerifolium, (maple guelder rose, dockmackie. O. w. J. ♀) leaves heart ovate or 3-lobed, acuminate, sharp serrate, pubescent beneath; cymes long peduncled. Stem very flexible; leaves broad and sub-membranaceous. 4—6. f. Leaves applied to inflamed tumours by the Indians.

Exotic.

Opulus, (guelder rose, snow-ball. w. J. ♀) leaves 3-lobed, sharp toothed; petioles glandular, smooth; flowers in compact cymes, surrounded with radiating florets. Var. *roseum*, has the whole cyme made up of radiating florets.

5—1. VIOLA.

Stemless, or with a subterranean stem.

Leaves more or less reniform, always cordate, younger cucullate; proper colour of the corolla violet.)

Cucullata, (O. p. b. M. ♀) glabrous; leaves cordate, somewhat acumi-

nate, crenate dentate; autumnal ones largest, very exactly reniform; peduncle somewhat 4-sided, longer than the leaves; divisions of the calyx subulate, acuminate, marginate behind, or very entire; petals (as in many American species) oblique, veiny, very entire, white at the base, upper one generally naked, glabrous, lateral ones bearded, and with the upper one marked with a few blue lines. Var. *papilionacea*, petioles and peduncles longer; sub-lance ovate; beards of the lateral petals often yellow. Var. *tetragona*, peduncle strong, exactly 4-sided; petals azure colour, veinless. Var. *villosa*, leaves, petals, and peduncles villose. 4—8. i.

(Leaves oblong or ovate, never reniform; younger ones cucullate.)
Sagittata, (E. b. p. Ap. 7) glabrous; leaves ciliate, oblong, not acute, sagittate cordate, dentate, gashed at the base (or furnished with elongated divaricate teeth); peduncle somewhat 4-sided, longer than the leaves; divisions of the calyx lanceolate, acuminate, emarginate behind; petals all very entire, veiny, white at the base; upper one generally naked, glabrous; lateral ones densely bearded, and with the upper one marked with a few blue lines; spur elongated behind. A variety has the leaves more or leaves more or less villose. Dry.

(Stemless.)

Rotundifolia, (O. M. y. 2) glabrous; leaves thickish, appressed to the earth, broad ovate or obicular, cordate, crenate; nerves pubescent beneath; sinns closed, peduncle somewhat 4-sided, as long as the leaves; divisions of the calyx oblong, obtuse; petals somewhat emarginate; upper ones small; lateral ones somewhat bearded, and with the upper one marked with a few yellowish brown lines; spur very short.—Woods. 1—3. i.

Cauliscent.

Pubes'cens, (O. y. 2) villose pubescent; stem simple, erect, terete, leafless below; leaves broad ovate, cordate, dentate; petioles short; stipules large, ovate, dentate; peduncles 4-sided, shorter than the leaves; bracts subulate, minute; divisions of the calyx lanceolate; petals all very entire, veinless; upper one naked, glabrous lateral ones bearded, and with the upper one, marked with a few blue lines; lower ones often becoming reddish outside; spur short, gibbose, acutish; stigma pubescent, scarcely beaked. Varies in pubescence; leaves are even found glabrous; the capsules are also glabrous or woolly. 4—12. i. rarely—4. f.

Exotic.

Tri'color, (garden violet, heart's ease, pansy. p. y. b. p. M. 2) stem angular, diffuse, divided; leaves oblong, deeply crenate; stipules lyrata pinnatifid.

19—3. ZEA. (An ancient Greek name, perhaps from *zao*, to live.)

Southern.

Maize, (indian corn. y-g. Ju ☉) leaves lance-linear, entire, keeled.

VOCABULARY,

OR

EXPLANATION OF BOTANICAL TERMS

A.

- A.* in composition, signifies privation, or destitute of; as, *acautis*, referring to a plant without a caulis or stem.
Abortive flower. Falling off without producing any fruit.
 — stamens, not furnished with anthers.
 — pistil. Defective in some essential part.
 — seed, not becoming perfect through want of the fertilizing influence of the pollen.
Abrupt leaf. A pinnate leaf with an odd or terminal leaflet.
Acalyces, (from *a*, signifying without, and *calyx*, a flower cup.) A class in an ancient method of arrangement, consisting of plants without a calyx.
Acaules, (from *a*, wanting, and *caulis*, a stem.) Including plants without stems.
Acerose leaf. Linear and permanent, as in the pine.
Acicular. Needle shaped.
Actinus. A small berry which, with many others, composes the fruit of the mulberry and raspberry; the plural is *actini*.
Acotyled'onous, (from *a*, without, and *cotyledon*, a seed lobe.) Plants destitute of seed lobes, and which consequently put forth no seminal or seed leaves, as mosses and ferns.
Aculeus, (from *acus*, a needle.) A prickle, or sharp point; common to the rose and raspberry. It differs from the thorn, in being a prolongation of the outer bark of the plant, and unconnected with the wood. Prickles have been compared to the nails and claws of animals.
Acuminate. Abruptly sharp pointed, having the point curved towards one edge of the leaf, resembling an awl.
Acute. More gradually sharp pointed than acuminate. An obtuse angle, or any other mathematical angle, is acute in botanical language.
Adelphous, (from the Greek *adelphos*, a brother or an equal.) Applied to plants whose stamens are united by their filaments, whether in one or two sets.
Adnate. Growing together.
Adversifolia, (from *adversus*, opposite, and *folium*, a leaf.) Plants whose leaves stand opposite to each other, on the same stem or branch.

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Estiva'les, (from *estas*, summer.) Plants which blossom in summer
Ajora, (from *a*, without, and *fores*, a door.) Having no doors or valves.

Agamous, (from *a*, without, and *gamos*, marriage.) Plants without any visible stamens or pistils, are by French botanists called *agamous*.

Ag'es of plants. *Ephemeral* are such as spring up, blossom, and ripen their seed in a few hours or days; *annual* live a few months, or one summer

biennial, spring up one summer, and die the following.

perennia', live an indefinite period.

Ag'gregate, (from *aggregare*, to assemble.) Many springing from the same point: this term was at first applied to compound flowers, but there is at present a sevenfold division of aggregate flowers; the *aggregate*, properly so called.

compound,
umbellate,
cymose,
amentaceous,
glumose,
spadiceous.

Aggregate flower is erected on peduncles or footstalk, which all have one common receptacle on the stem; they sometimes have one common calyx, and are sometimes separately furnished with a calyx.

Ai'rette. See egret.

Al'a. A Latin word signifying a wing. It is sometimes used to express the angle formed by the stem with the branch or leaf. Linnæus and some others use the term *ala*, as the name of a membrane affixed to some species of seeds which serves as a wing to raise them into the air, and thus promotes their dispersion.

Al'e. The two lateral or side petals of a papilionaceous flower.

Albu'men. The farinaceous, fleshy, or horny substance, which constitutes the chief bulk of monocotyledonous seeds; as wheat, rye, &c.

Alburnum, (from *albus*, white.) The soft white substance, which in trees is found between the liber, or inner bark, and the wood, and becoming solid, in progress of time is converted into wood. From its colour and comparative softness, it has been styled the fat of trees. It is called the *sap wood*, and is formed by a deposit of the cambium or descending sap; in one year it becomes wood; and a new layer of alburnum is again formed by the descent of the cambium.

Al'ga. Flags; these by Linnæus comprise the plants of the order *Hepaticæ* and *Lichenes*.

Al'pine. Growing naturally on high mountains.

Alter'nate. Branches, leaves, flowers, &c. are alternate, when beginning at different distances on the stem; opposite, is when they commence at the same distances, and base stands against base.

Alte'nately pinnate leaf; when the leaflets are arranged alternately on each side of the common footstalk or petiole.

Alve'olate. Having cells which resemble a honey-comb.

Am'bitus. The outer rim of a frond, receptacle, &c.

A'ment. Flowers collected on chaff scales, and arranged on a thread

or slender stalk; these scales mixed with the flowers, resemble the chaff in an ear of corn; in the willow and poplar, an ament supports both staminate and pistillate flowers on distinct roots. Flowers supported by an ament are generally destitute of a corolla.

Amplicau'lis. Clasping the base of the stems.

Anal'ysis. To analyze a plant *botanically*, is to ascertain its name, by observing its organs, and comparing them with scientific descriptions of plants.

Ancip'ital. Having two sharp edges like a sword.

An'dria. Signifies stamens.

Androg'ymous plants. Such as bear staminate and pistillate flowers on the same root; as the oak and indian corn; such plants belong to the class *Monœcia*.

Angiocar'pus. Fungi, bearing seeds internally.

Angiosper'mal, (from *angion*, a vessel, and *sperma*, seed.) Plants whose seeds are inclosed or covered.

Angular. Forming angles; when the stems, calyxes, capsules, &c. have ridges running lengthwise.

Angustifo'lius. Narrow-leaved.

An'nual. A plant which lives but one year. The herbage is often annual, while the root is perennial; in this case the plant is said to be perennial.

Annula'ted. Having a ring round the capsules, as in ferns; or in mushrooms having a ringed stripe.

Annu'lus. A ring.

Anom'alous, (from *a*, without, and *nomos*, law.) Irregular, or whatever forms an exception to a general rule.

Anther, (from *anthos*, a flower, so called, as indicating its importance.) That part of the stamen which contains the pollen; it is of various forms, as linear, awl-shaped, heart-shaped, round, &c.; it is 1-celled, 2-celled, &c.; the anther of the crown imperial has 4 cells.

Antherid'ium. A mass of pollen.

Antheris'erous. Flowers bearing anthers without filaments.

Anthus, (from the Greek *anthos*.) A flower generally referring to the petals only.

Apet'alous, (from *a*, without, and *petalum*, a petal.) Having no petals, such flowers are termed *incomplete*; such as are destitute of either stamens or pistils are called *imperfect*.

Apet'ala. A class formed by some of the ancient botanists, including plants destitute of corollas.

A'pez. The top or summit.

Aphy'lous, (from *a*, without, and *phylon*, a leaf.) Destitute of leaves
Aphy'læ is the name given by an ancient botanist to a class of plants without leaves, comprising garlic, rush, mushrooms, &c.

Appen'daged. Having bracts, thorns, prickles, &c.

Appres'sed. Closely pressed; as leaves against the stem, &c.

Approximate. Growing near each other.

Ap'terous. Without wings.

Aquat'ic, (from *aqua*, water.) Growing in, or near water.

Aquatica, was an ancient name for a class including all plants which grow in water.

- Ar'bor.** A tree; a perennial plant, which rises to a considerable height having a woody stem. Most trees spring from seeds having two cotyledons; they are therefore called dicotyledonous plants. The stems of such plants are said to be *exogenous*, that is, growing externally, new layers of wood being every year formed under the bark around the outside of the old wood. Palm trees are monocotyledonous plants; their stems are called *endogenous*, that is, growing internally, and pressing upon the outer coats, which become hard and compact. The ancient botanists divided plants into trees and herbs; but this distinction is too vague to form the basis of classification.
- Arbustivus.** (from *arbutum*, a shrub.) An ancient class of plants containing shrubs, as the myrtle, mock-orange, &c.
- Arcuate.** (from *arcus*, a bow.) Bent like a bow.
- Arcuarius.** Growing in sand.
- Argent'cus.** Silver coloured.
- Ar'id.** Dry.
- Ar'il.** (*arillus*.) The external coat or covering of seeds which, drying, falls off spontaneously.
- Aris'tate.** (from *arceo*, to be dried.) Awned, ending in a bristle.
- Aro'idcs.** So called from *arum*, and forming a natural family of plants.
- Arms.** (*arma*.) Offensive weapons. Plants are said to be armed, when they are furnished with prickles, thorns, &c.
- Aromatic.** Sweet scented.
- Ar'row-form.** Shaped like an arrow head, the hind lobes acute.
- Articulated.** Jointed, as in the culm or stem of the grasses.
- Arundina'ceous.** (from *arundo*, a reed.) Resembling reeds.
- Arvensis.** Growing in cultivated fields.
- Ascending.** Rising from the ground obliquely.
- Asperifolius.** Rough leaved.
- Attenuated.** Gradually diminished or tapering.
- Auriculate.** Having appendages resembling ears.
- Axil-form.** Sharp at the point, and curved to one side.
- Awn.** A short stiff bristle.
- Ax'il.** The angle between a leaf and stem on the upper side.
- Axillary.** Growing out of the axils: leaves are said to be axillary when they proceed from the angle formed by the stem and branch.

B.

- Bac'ca.** A berry. It is a pulpy pericarp, enclosing seeds without capsules. In the raspberry of a seed.
- Baccif'erous.** Bearing berries.
- Ban'ner.** The upper petal in a papilionaceous flower.
- Barb.** A straight process armed with teeth pointing backwards.
- Barbat'us.** Bearded.
- Bark.** The covering of vegetables, consisting of several parts, as cuticle, cellular integument, &c. The bark consists of as many layers as the tree on which it grows has years: a new layer being formed from the cambium every year, the newest layer of bark is called liber.
- Barren.** Producing no fruit; containing stamens only.

- Beak'ed.** Terminating by a process shaped like the beak of a bird.
- Ber'ry.** A pulpy pericarp enclosing seeds without capsules. See *Bacca*.
- Bi.** derived from *bis*, signifying two.
- Bicor'nes.** Anthers with two thorns.
- Bi'dens.** Having two teeth.
- Bien'nial.** Living two years, in the second of which the flower and fruit are produced; as in wheat.
- Bi'fid.** Two parted.
- Bilab'iate.** Corolla with two lips.
- Bipin'nate.** Twice pinnate.
- Biter'nate.** Twice ternate. The petiole supporting three ternate leaves.
- Bi'valve.** Two valved.
- Border.** The brim or spreading part of a corolla.
- Bot'rus.** A cluster, like grapes.
- Brach'iate.** Branches opposite, and each pair at right angles with the preceding.
- Bract.** Floral; a leaf near the flower which is different from the other leaves of the plant. In the crown imperial the bracts are at the termination of the flower stem; from their resemblance to hair, they are called coma.
- Branch.** A division of the main stem or main root.
- Branch'let.** Subdivision of a branch, a twig.
- Brevis.** Short.
- Bud.** The residence of the infant leaf and flower.
- Bulbs.** A kind of roots; sometimes found growing on the stem strictly speaking, bulbs are buds, or the winter residence of the future plants. A bulb contains in miniature or embryo, a plant similar to the parent plant. Plants may be renewed from bulbs as well as seeds. Annual plants do not have bulbs; they are only preserved by seeds.
- Bundle.** See *Fascicle*.

C.

- Caducous.** (from *cado*, to fall.) Falling early; as the calyx of the poppy.
- Caspiose.** Forming tufts, several roots growing together.
- Calamus.** Reed like.
- Calcareous.** Containing lime; as in the shells of oysters, &c.
- Calyculated.** Having an additional calyx.
- Calypt'ra.** The cap or hood of pistillate mosses, resembling an extinguisher set on a candle. Although called a calyx, it is in reality the corolla of the moss closed.
- Calyx.** From the Greek, signifying a flower cup: in most plants it incloses, and supports the bottom of the corolla. It is defined by Linnæus to be the termination of the outer bark.
- Cambium.** The descending sap, which every year forms a new layer of bark and one of wood. It descends between the bark and the wood, so that the new wood is formed externally, and the new bark internally.

- Campanulate.* Bell-form.
Campestris. Growing in uncultivated fields.
Canescent. White or hoary.
Capillary. Hair-form.
Capitate. Growing in heads.
Capsule. A little chest; that kind of hollow seed-vessel which becomes dry and opens when ripe; a capsule that never opens is called a *samara*.
Carina. The keel or lower folded petal of a papilionaceous flower.
Carinated. Keeled, having a sharp back like the keel of a vessel.
Carnose. Of a fleshy consistence.
Carpos. From the Greek *Karpos*, fruit.
Caryophyllous. Pink-like corolla, having five petals with long claws, all regular and set in a tubular calyx.
Catkin. See Ament.
Caudate. Having a tail; as in some seeds.
Caudex. The main body of a tree, or root.
Cauliscent. Having a stem exclusive of the peduncle or scapes.
Cauline. Growing on the main stem.
Caulis. The main herbage-bearing stem of all plants, called in French, *la tige*.
Cell. The hollow part of a pericarp or anther; each cavity in a pericarp that contains one or more seeds, is called a cell. According to the number of these cells the pericarp is one-celled, two-celled, three-celled, &c.
Cellular. Made up of little cells or cavities.
Cerealis. Any grain from which bread is made. (From *Ceres*, goddess of corn.)
Cermeus. When the top only droops.
Chaffy. Made up of short membranous portions like chaff.
Channelled. Hollowed out longitudinally, with a rounded groove.
Chorion. A clear limpid liquor contained in a seed at the time of flowering. After the pollen is received, this liquor becomes a perfect embryo of a new plant.
Cicatrice. The mark or natural scar from whence the leaf has fallen.
Ciliate. Fringed with parallel hairs.
Cinereous. Ash-coloured.
Cinogens. Surrounding, girding around.
Cirrose. Bearing a tendril. From *Cirrus*, a tendril or climber.
Cirring. Surrounding the stem with the base of the leaf.
Class. The highest divisions in the system of Botany. Linnæus divided all plants into 24 classes; 3 of these are now rejected, and the plants which they included placed in the remaining 21 classes. The ancient botanists knew neither methods, systems, nor classes; they described under chapters, or sections, those plants which appeared to them connected to each other by the greatest number of relations.
Clavate. Club-shaped, larger at the top than at the bottom.
Clavatus. Closed, shut up.
Claw. The narrow part by which a petal is inserted.
Cleft. Split or divided less than half way.
Climbing. Ascending by means of tendrils; as grapes; by leaf stalks

- as the Clematis; by cauline radicals or little fibrous roots, as the creeping American ivy.
Club-shaved. See clavate.
Clustred. See racemed.
Clypeate. Form of a buckler. See Peltate.
Coadunate. United at the base.
Coccinemus. Scarlet coloured.
Cochleate. Coiled spirally, like a snail shell.
Coccum. A grain or seed; triccoccus, 5-seeded, &c.
Ceruleus. Blue.
Collinus. Growing on hills.
Coloured. Different from green; in the language of botany, green is not called a colour. White, which in reality is not a colour, is so called in botany. The primitive colours and their intermediate shades and gradations, are by botanists arranged as follows:
 Water-colour, *hyalinus*.
 White, *albus*.
 Lead-colour, *cinereus*.
 Black, *niger*.
 Brown, *fuscus*.
 Pitch-black, *ater*.
 Yellow, *luteus*.
 Straw-colour, *flavus*.
 Flame-colour, *fulvus*.
 Red, *rubex*.
 Flesh-colour, *incarnatus*.
 Scarlet, *coccineus*.
 Purple, *purpureus*.
 Violet-colour, *cæruleo-purpureus*.
 Blue, *cæruleus*.
 Green, *viridis*.
 White is most common in roots, sweet berries, and the petals of spring flowers. Black, in roots and seeds. Yellow, in anthers, and the petals of compound flowers. Red, in the petals of summer flowers and acid fruits. Blue and violet, in the petals. Green, in the leaves and calyx.
Columella. That which connects the seed to the inside of the pericarp. The central pillar in a capsule.
Column. The style of gynandrous plants; used for columella.
Coma. A tuft of bracts on the top of a spike of flowers.
Compound flowers. Such as are in the class Syngenesia, having florets with united anthers.
 — *leaf.* When several leaflets grow on one petiole.
 — *raceme.* When several racemes grow along the side of a peduncle.
 — *umbel.* Having the peduncles subdivided into peduncles of lesser umbels.
 — *petiole.* A divided leaf stalk.
 — *peduncle.* A divided flower stalk.
Compresssed. Flattened.
Conchology. The science which treats of shells.

- Cone*. A scaly fruit like that of the pine. See *Strobilum*.
Conglomerate. Crowded together.
Conic. With a broad base, gradually narrowing to the top like a sugar loaf.
Coniferous. Bearing cones.
Conjugate. In pairs.
Connate. Opposite, with the bases united or growing into one forming the appearance of one leaf. Anthers are sometimes connate.
Convergent. Converging, the ends inclining towards each other.
Continous. Uninterrupted.
Contorted. Twisted.
Contracted. Close, narrow.
Converging. Approaching or bending towards each other.
Convex. Swelling out in a roundish form.
Convolute. Rolled into a cylindrical form, as leaves in the bud.
Corymb, or *Corole*. The embryo or miniature of the future plant, which is found in seeds often between the cotyledons.
Cordate. Heart-shaped, side lobes rounded.
Coriaceous. Resembling leather; thick and parchment-like.
Cornu. A horn or spur.
Corniculate. Horn shaped.
Corolla, or *corol*, (a word derived from *corona*, a crown.) Usually encloses the stamens.
Coronatus. Crowned; as the thistle seed is crowned with down.
Cortex, (from *corium*, leather, or hide, and *lego*, to cover.) The rind or coarse outer bark of plants; the organization of the outer and inner barks differs chiefly in the fineness of their texture.
Cortical. Belonging to the bark.
Corymbis. Helmet like.
Corymb. Inflorescence, in which the flower stalks spring from different heights on the common stem, forming a flat top.
Costate. Ribbed.
Cotyledons, (from *kotyle*, a cavity.) Seed lobes. The fleshy part of seeds which in most plants rises out of the ground and forms the first leaves, called seminal or seed leaves. These lobes in the greatest proportion of plants, are two in number; they are very conspicuous in the leguminous seeds; as beans, peas, &c. The cotyledons are externally convex, internally flat, and enclose the embryo or principle of life, which it is their office to nourish.
Creeping. Running horizontally; stems are sometimes creeping, as also roots.
Crenate. Scalloped, notches on the margin of a leaf which do not point towards either the apex or base.
Crenulate. Finely crenate.
Crescent-form. Resembling a half moon.
Crested. Having an appearance like a cock's comb.
Crinitus. Long haired.
Cruciform, (from *crux*, *crucis*, a cross.) Four petals placed like a cross.
Crustaceous. Small crusty substances lying one upon another
Cryptogamia. Stamens and pistils concealed.

- Subit*. A measure from the elbow to the end of the middle finger.
Cucullate. Hooded or cowed, rolled or folded in, as in the spathe of the Arum or wild turnip.
Cucurbitaceous. Resembling gourds or melons.
Culinary. Suitable for preparations of food.
Culm or straw, (from the Greek *kalama*, stubble or straw; in Latin *culmus*.) The stem of grasses, Indian corn, sugar cane, &c.
Culmiferous. Having culms; as wheat, grasses, &c.
Cuneiform. Wedge-form, with the stalk attached to the point.
Curved. Bent inwards. See *Incurved*.
Cuspidate. Having a sharp straight point. (The eye tooth is cuspidate.)
Cuticle. The outside skin of a plant, commonly thin, resembling the scarf or outer skin of animals. It is considered as forming a part of the bark.
Cyanus. Blue.
Cyathiform. Shaped like a common wine glass.
Cylindrical. A circular shaft of nearly equal dimensions throughout its extent.
Cyme. Flower stalks arising from a common centre, afterwards variously sub-divided.
- D.
- Debilis*. Weak, feeble.
Decandrous. Plants with ten stamens in each flower.
Decaphyllus. Ten leaved.
Deciduous. Falling off in the usual season; opposed to *persistent* and *evergreen*, more durable than *caducous*.
Declined. Curved downwards.
Decomposition. Separation of the chemical elements of bodies.
Decomposed. Twice compound, composed of compound parts.
Decumbent. Leaning upon the ground, the base being erect.—This term is applied to stems, stamens, &c.
Decurrent. When the edges of a leaf run down the stem or stalk.
Decussated. In pairs, crossing each other.
Deflected. Bent off.
Defoliation. Shedding leaves in the proper season.
Dehiscent. Gaping, or opening.—Most capsules when ripe are dehiscent.
Deltoïd. Nearly triangular, or diamond form, as in the leaves of the Lombardy poplar.
Demersus. Under water.
Dense. Close, compact.
Dentate. Toothed; edged with sharp projections; larger than serrate.
Denticulate. Minutely toothed.
Dismutate. Plants whose flowers appear before the leaves; appearing naked.
Downsum. Downwards.
Depressed. Flattened, or pressed at the top.
Descriptions. In giving a complete description of a plant, the order of nature is to begin with the root, proceed to the stem, branches, leaves, appendages, and lastly to the organs which compose the flower, and the manner of inflorescence. Colour and size are circumstances

- least to be regarded in descriptions, but stipules, bracts, and glandular hairs, are all of importance.
- Dextrar'sum*. Twining from left to right, as the hop vine.
- Diadelphous*. (from *dis*, two, and *adelphos*, brotherhood,) two brotherhoods. Stamens united in two parcels or sets; flowers mostly papilionaceous; fruit leguminous.
- Diamond form*. See Deltoid.
- Diantharia*. (from *dis*, two, and *anther*;) a class of plants including all such as have two anthers.
- Dichotomous*. Forked, dividing into two equal branches.
- Dictynna*. Stamens in one flower, and pistils in another; whether on the same plant or on different plants.
- Dicotylous*. Containing two grains of seed.
- Dicotyledonous*. With two cotyledons or seed lobes.
- Didymous*. Twinned, or double.
- Didynamia*. (from *dis*, twice, and *dunamis*, power;) two powers. A name of one of the Linnæan classes.
- Diffraetel*. Twice bent.
- Digitate*. Like fingers. When one petiole sends off several leaflets from a single point at its extremity.
- Digynia*. Having two pistils.
- Dimidiate*. Halved.
- Diacous*. Having staminate and pistillate flowers on different plants.
- Discoid*. Resembling a disk without rays.
- Disk*. The whole surface of a leaf, or of the top of a compound flower as opposed to its rays.
- Dispermus*. Containing two seeds.
- Dissipiment*. The partition of a capsule.
- Dissiliens*. A pericarp, bursting with elasticity, as the Impatiens.
- Distichus*. Growing in two opposite ranks or rows.
- Divergate*. Diverging so as to turn backwards.
- Diverging*. Spreading. Separating widely.
- Durinus*. Enduring but a day.
- Dorsal*. Belonging to the back.
- Dotted*. See Punctate and Perforated.
- Drooping*. Inclining downward, more than nodding.
- Drupe*. A fleshy pericarp enclosing a stone or nut.
- Drupaceous*. Resembling, or bearing drupes.
- Dulcis*. Sweet.
- Dumosus*. Bushy.
- Duplez*. Double.

E.

- Eared*. Applied to the lobes of a heart-form leaf, to the side lobes near the base of some leaves, and to twisted parts in the plants which are supposed to resemble the passage into the ear.
- Eburneus*. Ivory white.
- Echinate*. Beset with prickles, as a hedge-hog.
- Ecostate*. Without nerves or ribs.
- Efflorescentia*. (from *effloresco*, to bloom.) A term expressive of the precise time of the year, and the month in which every plant closes

- soms. The term *efflorescence* is applied to the powdering substance found on Lichens.
- Effoliation*. Premature falling off of leaves, by means of diseases or some accidental causes.
- Effuse*. Having an opening by which seeds or liquids may be poured out.
- E'grael*, or *Ai'grette*. The feathery or hairy crown of seeds, as the down of thistles and dandelions. It includes whatever remains on the top of the seed after the corolla is removed.
- stiped*. When it is supported on a foot stem.
- simple*. When it consists of a bundle of simple hairs.
- plumose*. When each hair has other little hairs arranged along its sides.
- Elliptic*. Oval.
- Elongated*. Exceeding a common length.
- Emarginate*. Having a notch at the end, retuse.
- Embryo*. (from *embryo*, to bud forth,) the germ of a plant; called by Linnæus the *corculum*.
- Endogenous*. Applied to stems which grow from the centre outwardly, as in monocotyledons.
- Endis*. Without joints or knots.
- Ensisiform*. Sword form, two edged, as in the flag and iris.
- Entire*. Even and whole at the edge.
- Entomology*. The science of insects.
- Epi*. A Greek word signifying upon; often used in composition.
- Epicarp*. (from *epi*, upon, and *karpos*, fruit,) the outer skin of the pericarp.
- Epidermis*. (from *epi*, upon, and *derma*, skin.) See Cuticle.
- Epigynous*. (from *epi*, upon, and *gynia*, pistil.)
- Episperm*. (from *epi*, upon, and *sperma*, seed.)
- Equinoctial flowers*. Opening at stated hours each day.
- Equitant*. Opposite leaves alternately enclosing the edges of each other.
- Erect*. Straight; less unbending than strictus.
- Eroded*. Appearing as if gnawed at the edge.
- Esculent*. Eatable.
- Evergreen*. Remaining green through the year, not deciduous.
- Excavatus*. Hollowed out.
- Exotic*. Plants that are brought from foreign countries.
- Expand*. Spread.
- Expectorant*. (from *expectoro*, to discharge from the breast,) medicines which promote a discharge from the lungs.
- Exserted*. Projecting out of the flower or sheath.
- Eye*. See Hilum.

F.

- Fabulous*. Not natural, produced by art, (from *facio*, to make.)
- Families*. A term in Botany implying a natural union of several genera into groups; sometimes used as synonymous with Natural Orders.
- Falcate*. Sickle shaped. Linear and crooked.

Fari'na, (from *far*, corn.) Meal or flour. A term given to the glutinous part of wheat and other seeds, which is obtained by grinding and sifting.

It consists of gluten, starch, and mucilage. The pollen is also called farina.

Fas'cicle. A bundle.

Fascic'ulate. Collected in bundles.

Fastig'iate. Flat topped.

Favo'sus. Resembling a honey comb.

Faux. Jaws. The throat of the corolla.

Ferns. Cryptogamous plants, with the fruit on the backs of the leaves or in spikes made up of minute capsules opening transversely.

Fer'tile. Pistillate, yielding fruit.

Fil'ament. The slender, thread-like part of the stamen.

Fil'ices, (from *filum*, a thread.) Ferns.

Fil'iform. Very slender.

Fim'briate. Divided at the edge like fringe.

Fis'tulous. Hollow or tubular, as the leaf of the onion.

Flac'id. Too limber to support its own weight.

Flagel'liform. Like a whip lash.

Flam'meus. Flame coloured.

Flav'us. Yellow.

Flex'uons. Serpentine, or bending in a zig-zag form.

Flo'ra. Considered by the heathens as the goddess of flowers. Books describing flowers are often called *Floras*.

Flo'ral leaf. See Bract.

Flo'ret. Little flower, part of a compound flower.

Flos'cular. A tubular floret.

Flow'er, (Flos.) A term which was formerly applied almost exclusively to the petals. At present a stamen and pistil only are considered as forming a perfect flower.

Flow'er stalk. See Peduncle.

Folia'ceous. Leafy.

Fol'icles. Leaflets; a diminutive of folium, a leaf. The smaller leaves which constitute a compound leaf.

Fo'lium leaf. Leaves are fibrous and cellular processes of plants; they are of different figures, but generally extended into a membranous or skinny substance.

Fol'icle. A seed vessel which opens lengthwise, or on one side only.

Foot-stalk. Sometimes used instead of Peduncle and Petiole.

Frag'ilis. Breaking easily, and not bending.

Fron'd. The leaf of Cryptogamous plants; formerly applied to palms.

Fron'des'cence, (from *frons*, a leaf.) The time in which each species of plants unfolds its leaves. See Frondose.

Fron'do'se, (Frondosus.) Leafy, or leaf-like.

Fructif'ication. The flower and fruit with their parts.

Fructif'erous. Bearing or becoming fruit.

Fruc'tus. The fruit. This is an annual part of the plant which adheres to the flower and succeeds it; after attaining maturity it detaches itself from the parent plant, and on being placed in the bosom of the earth, gives birth to a new vegetable. In common language, the fruit includes both the pericarp and the seed, but strictly speaking, the

latter only is the fruit, while the former is but the case or vessel which contains it.

Gru'tes cent. Becoming shrubby.

Frut'ice. A shrub.

Frut'era. Props supports; as the petiole, peduncle, &c.

Frut'ivous. Yellowish.

Fun'gi. The plural of Fungus, a mushroom.

Fun'gous. Growing rapidly, with a soft texture like the Fungi.

Fun'nel-form. Tubular at the bottom and gradually expanded at the top.

Fu'siform. Spindle shaped, a root thick at the top and tapering downwards.

G.

Gal'lea. A helmet.

Gen'na. A bud containing a plant seated upon the stem and branches, and covered with scales, in order to defend it from injury. The bud resembles the seed in containing the future plant in embryo; but this embryo is destitute of a radicle, though if the bud is planted in the earth, a radicle is developed.

Gemma'ceous. Belonging to a bud. Made of the scales of a bud.

Gen'e'ic name. The name of a genus.

Gen'e'ulate. Bent like a knee.

Ge'nus, (the plural of genus is *genera*.) a family of plants similar in their flower and fruit. Plants of the same genus usually possess similar medicinal powers.

Germ. The lower part of the pistil which afterwards becomes the fruit.

Germina'tion. The swelling of a seed, and the unfolding of its embryo.

Gib'bous. Swelled out commonly on one side.

Glab'rous. Bald, without covering.

Glab'rrous. Sleek, without hairiness.

Gland. A small appendage, which seems to perform some office of secretion or exhalation.

Gland'ular. Having hairs tipped with little heads or glands

Glauc'ous. Sea green, mealy, and easily rubbed off.

Glome. A roundish head of flowers.

Glom'erate. Many branchlets terminated by little heads.

Glume. The scales or chaff of grasses, composing the calyx and corolla, the lower ones are called the calyx, all others the corolla, each scale, chaff, or husk, is called a valve; if there is but one, the flower is called univalve, if two, bivalve.

Glu'tinous. Viscid, adhesive.

Gon, (from *gonu*, a knee or angle;) as pentagon, five angled; hexagon, six angled; polygon, many angled.

Graft'ing. Is the process of uniting the branches or buds of two or more separate trees. The bud or branch of one tree, is inserted into the bark of another, and the tree which is thus engrafted upon is called the stock.

- Gram'ina.* Grasses and grass-like plants. Mostly found in the class Triand ia.
- Gramin'eous.* Grass like; such plants are also called culmiferous.
- Grandiflorus.* Having large flowers.
- Granular.* Formed of grains, or covered with grains.
- Grave'olens.* Having a strong odour.
- Gregarious.* In flocks, plants growing together in groups.
- Groov'ed.* Marked with deep lines.
- Gymnosper'mia,* (from *gymnos*, naked, and *sperma*, seed.) Having naked seeds.
- Gynan'drous.* Stamens growing upon the pistil.
- Gyn'ia.* From the Greek, signifying pistil.

H.

- Habita'tio,* or *Habitat.* The native situation of plants.
- Habil.* The external appearance of a plant, by which it is known at first sight, without regard to botanical distinctions.
- Hair'-like.* See Capillary.
- Halbert-form.* See Hastate.
- Hand'-form.* See Palmate.
- Hang'ing.* See Pendant.
- Has'tate.* Shaped like a halbert; it differs from arrow-shaped in having the side processes more distinct and divergent.
- Head.* A dense collection of flowers, nearly sessile.
- Heart.* See Coraculum and Corcle.
- Heart-form.* See Cordate.
- Hel'met.* The concave upper lip of a labiate flower.
- Helminthol'ogy.* The science of worms.
- Hepal'ic.* Liver like.
- Herb.* A plant which has not a woody stem.
- Herba'ceous.* Not woody.
- Her'bage.* Every part of a plant except the root and fructification.
- Herba'rium.* A collection of dried plants.
- Hexag'onat.* Six cornered.
- Hi'ans.* Gaping.
- Hi'lum.* The scar or mark on a seed at the place of attachment of the seed to the seed vessel.
- Hir'sute.* Rough with hairs.
- His'pid.* Bristly, more than hirsute.
- Ho'ary.* Whitish coloured, having a scaly mealiness, not unlike glaucous.
- Holera'ceous.* Suitable for culinary purposes. The term is derived from *holus*, signifying pot herbs. One of the natural orders of Linnaeus, called *Holeraca*, includes such plants as are used for the table, or in the economy of domestic affairs.
- Hon'eycup.* See nectary.
- Hood'ed.* See Cucullate, or cowl'd.
- Hora'rius.* Continuing but an hour.
- Horizon'tal.* Parallel to the horizon.
- Horn.* See Spur.
- Hu'milis.* Low, humble.
- Husk.* The larger kind of glume, as the husks of Indian corn.

- Hyberna'lis.* Growing in winter.
- Hybrid.* A vegetable produced by the mixture of two species; the seeds of hybrids are not fertile.
- Hy'po.* From *upo*, under; much used in the composition of scientific terms.
- Hypocrater'iform.* Salver shaped, with a tube abruptly expanded into a flat border.
- Hypog'yneus.* Under the stvle.
- Icthyol'ogy.* The science of fishes.
- Icosan'drous.* Having about twenty stamens growing on the calyx. Such plants furnish a great proportion of the most delicious pulpy fruits.
- Im'bricate.* Lying over, like scales, or the shingles of a roof.
- Imper'fect.* Wanting the stamen or pistil.
- Incarna'tus.* Flesh coloured.
- Inci'sor.* Fore tooth.
- Incl'ud.* Wholly received, or contained in a cavity; the opposite of exsert.
- Incomple'te.* Flowers destitute of a calyx or corolla are said to be incomplete. A term differing from imperfect.
- Incras'sate.* Thickened upward, larger towards the end.
- In'crement.* The quantity of increase.
- Incum' bent.* Leaning upon or against.
- Incur' ved.* Bent inwards.
- Indig'enous.* Native, growing wild in a country, (some exotics after a time, spread and appear as if indigenous.)
- In'durated.* Becoming hard.
- Infe'rior.* Below; a calyx or corolla is inferior when it comes out below a germ.
- Infla'ted.* Appearing as if blown out with wind, hollow.
- Inflex'ed.* The same as incurved.
- Inflores'cence,* (from *infloresco*, to flourish.) The manner in which flowers are connected to the plant by the peduncle, as in the whorl, raceme, &c.
- Infrac'tus.* Bent in with such an acute angle as to appear broken.
- Infundibulifor'mis.* Funnel form.
- Inser'ted.* Growing out of, or fixed upon.
- Insi'dens.* Sitting upon.
- Insigni'tus.* Marked.
- In'teger.* Entire.
- Interno'de.* The space between joints; as in grasses.
- Interruptedly-pin'nate.* When smaller leaflets are interposed among the principal ones.
- Intror'tus.* Twisted inwards.
- Introdu'ced.* Not originally native. Brought from some other country.
- Involu'crum.* A kind of general calyx, serving for many lowers, generally situated at the base of an umbel or head.
- Involu'cel.* A partial involucreum.
- In'volute.* Rolled inwards.

- Irides'cent.* Reflecting light, (from Iris the rainbow.)
Irrégular. Differing in figure, size, or proportion of parts among themselves.
Irritability. The power of being excited so as to produce contraction; this power belongs to vegetables as well as animals; sensation is thought to imply the existence of internal properties not possessed by plants; though some have attributed sensation to plants, as well as animals.

J.

- Jag'ged.* Irregularly divided and sub-divided.
Jaws. See Faux.
Joints. Knots, or rings in culms, pods, leaves, &c.
Ju'gum. A yoke; growing in pairs.
Juxta-position, (from *juxta*, near, and *pono*, to place,) nearness of place.

K.

- Keel.* The under lip of a papilionaceous flower.
Keel'ed. Shaped like the keel of a boat or ship.
Kernel. See Nucleus.
Kia'ney-shaped. Heart-shaped without the point and broader than long.
Knee. A joint being geniculate.
Knob'bed. In thick lumps, as the potato.
Knot. See joints.

L.

- La'biate.* Having lips as in the class Didynamia.
Lacin'ate. Jagged, irregularly torn, lacerated.
Lactes'cent. Yielding a juice, usually white, like milk, sometimes red, as in the blood-root.
Lac'teus. Milk white.
Lacus'tris. Growing about lakes.
Læ'vis. Smooth, even.
Lamel'lated. In thin plates.
Lam'ina. The broad or flat end of a petal, in distinction from its claw.
La'nate. Woolly.
Lance'olate. Spear-shaped, narrow, with both ends acute.
Lance'o-vate. A compound of lanceolate and ovate, intermediate.
La'teral. On one side, (from *latus*.)
La'tent. Hidden, concealed, (from *lateo*, to hide.)
Lar'va. The caterpillar state of an insect.
Lax. Limber, lax.
Leaf'et. A partial leaf, part of a compound leaf.
Leaf'stalk. See petiole.
Leg'ume. A pod or pericarp having its seeds attached to one side of suture; as the pea and bean.
Legu'minous. Bearing legumes.
Lepan'thiums. A term used for a petal-like nectary; like that of the larkspur and monkshood.
Li'ber. The inner bark of plants. Immediately under the cuticle is a succulent, cellular substance, for the most part of a green colour, especially in the leaves and branches. Under this cellular integument

- is the bark consisting of but one layer in plants or branches only one year old. In older branches and trunks of trees, it consists of as many layers as they are years old; the innermost and newest being called the *liber*: it is in this layer only that the essential vital functions are carried on for the time being, after which it is pushed outwards with the cellular integument, and like that, becomes a lifeless crust.
Lig'neous. Woody.
Lig'num. Wood.
Lig'ulate. Strap or ribbon like, flat, as the florets of the dandelion.
Lilia'ceous. A corolla with six petals gradually spreading from the base.
Limb. The border or spreading part of a monopetalous corolla.
Lin'ear. Long and narrow with parallel sides as the leaves of grasses.
Lip. The under petal in a labiate corolla.
Littora'lis. Growing on coasts, or shores.
Liv'idus. Dark purple.
Lobe. A large division; or distinct portion of a leaf or petal.
Loc'ulus. A little cell, from *locus* a place.
Lo'ment. A pod resembling a legume, but divided by transverse partitions.
Longifoli'us. Long leaved.
Longis'simus. Very long.
Luce'idus. Bright and shining.
Luce'id. Of a pale dull colour.
Lute'us. Yellow.
Ly'rate. Pinnatifid, with a large roundish leaflet at the end.

M.

- Macula'tus.* Spotted.
Marces'cent. Withering.
Margin. The edge, or border.
Mara'time. Growing near the sea.
Medul'la. The pith or pulp of vegetables. The centre or heart of the vegetable. Various opinions have been entertained respecting the importance of the pith; Linnæus considered that it was the seat of life and source of vegetation: that its vigour was the principal cause of the shooting forth of branches, and that the seeds were formed from it. It is now generally thought that the pith does not perform so important a part in the economy of vegetation as was supposed by Linnæus.
Mellif'erosus. Producing, or containing honey.
Mem'branous. Very thin and delicate.
Mid'rib. The main or middle rib of a leaf running from the stem to the apex.
Minia'tus. Scarlet, vermilion colour.
Mola'res. Back teeth, grinders.
Mol'tis. Soft.
Mollus'cosus. Such animals as have a soft body without bones; as the oyster.

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Mol'tis. Soft.
Mollus'cos. Such animals as have a soft body without bones; as the oyster.

- Monodel'phous.* Having the stamens united in a tube at the base.
Monili'form. Granulate, strung together like beads.
Monocotyl'edous. Having but one cotyledon.
Monoc'ious. Having pistillate and staminate flowers on the same plant.
Monopet'alous. The corolla composed of one petal.
Monophyl'lous. Consisting of one leaf.
Monosep'alous. A calyx of one piece or sepal.
Monosper'mus. One seed to a flower.
Montan'us. Growing on mountains.
Moon-form. See Crescent-form.
Mosses. The second order of the class Cryptogamia.
Mu'cronate. Having a small point or prickle at the end of an obtuse leaf.
Multiflo'rus. Many flowered.
Mult'iplex. Many flowered, petals lying over each other in two rows.
Mult'us. Many.
Mu'ricate. Covered with prickles.

N.

- Naked.* Destitute of parts usually found.
Na'nus. Dwarf fish, very small.
Nap. Downy, or like fur, tomentose.
Napifor'mis. Resembling a turnip.
Narcot'ic. (from the Greek word *narce*, torpor.) A substance which has the power of procuring sleep—Opium is highly narcotic.
Na'tant. Floating.
Natural Character. That which is apparent, having no reference to any particular method of classification.
Natural History. The science which treats of nature.
Nectary. (from nectar, the fabled drink of the gods.) The part of a flower which produces honey: this term is applied to any appendage of the flower which has no other name.
Nemor'us. Growing in groves, often given as a specific name, as *Anemone nemorosa*; the ending in *a* denotes the adjective as being in the feminine gender: the adjective in Latin varying its termination to conform to the gender of the substantive.
Nerves. Parallel veins.
Nerved. Marked with nerves, so called, though not organs of sensibility like the nerves in the animal system.
Nictitans. From a word which signifies to twinkle, or wink; applied as a specific name to some plants which appear sensitive; as the *Cassia nictitans*.
Ni'ger. Black.
Nil'idus. Glassy, glittering.
Niv'eus. Snow white.
Nod'ding. Partly drooping.
Node, Nodus. Knot.
No'men. A name.
Notch'ed. See Crenate.
Nu'cleus. Nut, or kernel.

- Nu'dus.* See Naked.
Nut, Nux. See Nucleus.
Nu'tant. See Nodding, Pendulous.

O.

- Ob.* A word which, prefixed to other terms, denotes the inversion of the usual position; as *obcordate*, inversely cordate.
Obcon'ic. Conic with the point downwards.
Obcor'date. Heart-shaped with the point downwards.
Ob lance'olate. Lanceolate with the base the narrowest.
Obli'que. A position between horizontal and vertical.
Oblong. Longer than oval, with the sides parallel.
Ob'ovate. Ovate with the narrowest end towards the stem, or place of insertion.
Obsolete. Indistinct, appearing as if worn out.
Obtu'se. Blunt, rounded, not acute.
Odora'tus. Scented, odorous.
Officinalis. Such plants as are kept for sale as medicinal, or of use in the arts.
Oid, Oi'des. This termination imports resemblance, as *petaloid*, like a petal; *thalictroides*, resembling a *thalictum*, &c.
Opaq'ue. Not transparent.
Oper'culum. The lid which covers the capsules of mosses.
Opposite. Standing against each other on opposite sides of the stem.
Orbicular. Circular.
Orchid'eous. Petals like the orchis, four-arched; the fifth longer.
Ornithology. That department of zoology which treats of birds.
Os. A bone. A mouth.
Os'eous. Bony, hard.
O'vary. A name sometimes given to the outer covering of the germ, before it ripens.
O'vate. Egg-shaped, oval, with the lower end largest.
Ovip'arous. Animals produced from eggs, as birds, &c.
O'vules. Little eggs; the rudiments of seeds which the germ contains before its fertilization; after that the ovules ripen into seeds.
Ovum. An egg.

P.

- Palate.* A prominence in the lower lip of a labiate corolla, closing or nearly closing the throat.
Palea'ceous. See Chaffy.
Palmate. Hand-shaped; divided so as to resemble the hand with the fingers spread.
Palustris. Growing in swamps and marshes.
Pandul'riform. Contracted in the middle like a violin or guitar.
Pan'icle. A loose, irregular bunch of flowers, with sub-divided branches, as the oat.
Pan'icled. Bearing panicles.
Papil'io. A butterfly.
Papilion'aceous. Butterfly-shaped—an irregular corolla consisting of four petals; the upper one is called the banner, the two side

- wings, and the lower one the keel, as the pea. Mostly found in the class Diadelphia.
- Papillose*. Covered with protuberances.
- Pappus*. The down of seeds, as the dandelion; a feathery appendage. See Egret.
- Parasitic*. Growing on another plant, and deriving nourishment from it.
- Parenchyma*. A succulent vegetable substance; the cellular substance; the thick part of leaves between the opposite surfaces; the pulpy part of fruits, as in the apple, &c.
- Partial*. Used in distinction to general.
- Partition*. The membrane which divides pericarps into cells, called the dissepiment. It is parallel when it unites with the valves where they unite with each other. It is contrary or transverse when it meets a valve in the middle or in any part not in its suture.
- Parted*. Deeply divided: more than cleft.
- Patens*. Spreading, forming less than a right angle.
- Pauci*. Few in number.
- Pectinate*. Like the teeth of a comb, intermediate between fimbriate and pinnatifid.
- Pedale*. Having a central leaf or segment and the two side ones which are compound, like a bird's foot.
- Pedicel*. A little stalk or partial peduncle.
- Peduncul*. A stem bearing the flower and fruit.
- Pellicle*. A thin membranous coat.
- Pellucid*. Transparent or limpid.
- Peltate*. Having the petiole attached to some part of the under side of the leaf.
- Pendant*. Hanging down, pendulous.
- Pencilled*. Shaped like a painter's pencil or brush.
- Peregrinus*. Foreign, wandering.
- Perennial*. Lasting more than two years.
- Perfoliate*. Having a stem running through the leaf; differs from connate in not consisting of two leaves.
- Perforate*. Having holes as if pricked through; differs from punctate, which has dots resembling holes.
- Petri*. Around.
- Petianth*. A sort of calyx.
- Pericarp*, (from *peri*, around, and *karpos*, fruit.) A seed vessel or whatever contains the seed.
- Perigynous*, (from *peri*, around, and *gynia*, pistil.)
- Perisperm*, (from *peri*, around, and *sperma*, seed.) Around the seed
- Permanent*. Any part of a plant is said to be permanent when it remains longer than is usual for similar parts in most plants.
- Persistent*. Not falling off. See Permanent.
- Personate*. Masked or closed.
- Petal*. The leaf of a corolla, usually coloured.
- Petiole*. The stalk which supports the leaf.
- Phanogamous*. Such flowers as have stamens and pistils visible, including all plants except the cryptogamous.
- Physiology*, (derived from the Greek.) A discourse of Nature

- Phytology*. The science which treats of the organization of vegetables; nearly synonymous with the physiology of vegetables.
- Pileus*. The hat of a fungus.
- Pillar*. See Columella and Column.
- Pilose*. Hairy, with distinct straightish hairs.
- Pilus*. A hair.
- Pimpled*. See Papillose.
- Pinna*. A wing feather; applied to leaflets.
- Pinnate*. A leaf is pinnate when the leaflets are arranged in two rows on the side of a common petiole, as in the rose.
- Pinnatifid*. Cut in a pinnate manner. It differs from pinnate, in being a simple leaf, deeply parted, while pinnate is a compound of distinct leaflets.
- Pistil*. The central organ of most flowers, consisting of the germ style, and stigma.
- Pistillate*. Having pistils, but no stamens.
- Pith*. The spongy substance in the centre of the stems and roots of most plants. See Medulla.
- Plaited*. Folded like a fan.
- Plane*. Flat, with an even surface.
- Plaited*. See Plaited.
- Plumose*. Feather-like.
- Plumula*, or *Plume*. The ascending part of a plant at its first germination.
- Plurimus*. Very many.
- Pod*. A dry seed vessel, most commonly applied to legumes and siliques.
- Podosperm*, (from *podos*, a foot, and *sperma*, seed.) Pedicel of the seed.
- Pointal*. A name sometimes used for pistil.
- Pollen*, (properly, fine flour, or the dust that flies in a mill.) The dust which is contained within the anthers.
- Polus*. Many.
- Polyandrous*. Having many stamens inserted upon the receptacle.
- Polygamous*. Having some flowers which are perfect, and others stamens only, or pistils only.
- Polymorphous*. Changeable, assuming many forms.
- Polypetalous*. Having many petals.
- Polyphyllous*. Having many leaves.
- Polysepalous*. A calyx of more than one sepal.
- Pome*. A pulpy fruit, containing a capsule, as the apple.
- Porous*. Full of holes.
- Premorse*. Ending bluntly, as if bitten off; the same as abrupt.
- Prasinus*. Green, like a leek.
- Pratensis*. Growing in meadow land.
- Prickle*, differs from the thorn, in being fixed to the bark; the thorn is fixed to the wood.
- Prismatic*. Having several parallel flat sides.
- Probasis*. An elongated nose or snout, applied to projecting parts of vegetables.
- Process*. A projecting part.
- Procumbent*. Lying on the ground.

- Proliferous*. A flower is said to be proliferous when it has smaller ones growing out of it.
Prop. Tendrils and other climbers.
Proximus. Near.
Pseudo. When prefixed to a word, it implies obsolete, or false.
Pubescent. Hairy, downy, or woolly.
Pulp. The juicy cellular substance of berries and other fruits.
Pulverulent. Turning to dust.
Pumilus. Small, low.
Punctate. Appearing dotted as if pricked. See Perforated.
Pungent. Sharp, acrid, piercing.
Purpureus. Purple.
Pusillus. Diminutive, low.
Putamen. A hard shell.

Q.

- Quadrangular*. Having four corners or angles.
Quaternate. Four together.
Quinate. Five together.

R.

- Raceme*, (from *rax*, a bunch of grapes, a cluster.) That kind of inflorescence in which the flowers are arranged by simple pedicels on the sides of a common peduncle; as the currant.
Rachis. The common stalk to which the florets and spikelets of grasses are attached; as in wheat heads. Also the midrib of some leaves and fronds.
Radiate. The legulate florets around the margin of a compound flower.
Radix. A root; the lower part of the plant, which performs the office of attracting moisture from the soil, and communicating it to the other parts of the plant.
Radical. Growing from the root.
 — The part of the corculum which afterwards forms the root—also the minute fibres of a root.
Ramiferous. Producing branches.
Ramus. A branch.
Ray. The outer margin of compound flowers.
Receptacle. The end of a flower stalk; the base to which the different parts of the organs of fructification are usually attached.
Reclinat. Bending over with the end inclining towards the ground.
Rectus. Straight.
Recurved. Curved backwards.
Reversed. Bent backwards more than recurved.
Refrigerant, (from *refrigero*, to cool.) Cooling medicines.
Reniform. Kidney-shaped, heart-shaped without the point.
Repand. Slightly serpentine, or waving on the edge.
Repens. Creeping.
Resupinate. Upside down.
Reticulate. Veins crossing each other like net-work.

- Retuse*. Having a slight notch in the end, less than emarginate.
Reversed. Bent back towards the base.
Revolute. Rolled backward or outward.
Rhomboid. Diamond-form.
Rib. A nerve-like support to a leaf.
Rigid. Stiff, not pliable.
Ring. The band around the capsules of ferns.
Ringent. Gaping or grinning; a term belonging to the labiate corollas.
Root. The descending part of a vegetable.
Rootlet. A fibre of a root, a little root.
Rosaecous. A corolla formed of roundish spreading petals, without claws, or with very short ones.
Roseous. Rose coloured.
Rostel. That pointed part of the embryo which tends downward at the first germination of the seed.
Rostrate. Having a protuberance like a bird's beak.
Rotate. Wheel-form.
Rotundus. Round.
Rubra. Red.
Rufous. Reddish yellow.
Rugose. Wrinkled.
Runcinate. Having large teeth pointing backwards, as the dandelion.
Rupes tris. Growing among rocks.

S.

- Sagittate*. Arrow-form.
Saltiferous. Bearing or producing salt.
Salsus. Salt tasted.
Salverform. Corolla with a flat spreading border proceeding from the top of a tube; flower monopetalous.
Samara. A winged pericarp not opening by valves, as the maple.
Sap. The watery fluid contained in the tubes and little cells of vegetables.
Sapor. Having taste.
Sarmentose. Running on the ground and striking root from the joint only, as the strawberry.
Sarcocarp, (from *sarz*, flesh, and *karpos*, fruit.) The fleshy part of fruit.
Scaber, or *Scabrous*. Rough.
Scandens. Climbing.
Scape. A stalk which springs from the root, and supports flowers and fruit but no leaves, as the dandelion.
Scariosus. Having a thin membranous margin.
Scattered. Standing without any regular order.
Scions. Shoots proceeding laterally from the roots or bulb of a root.
Segment. A part or principal division of a leaf, calyx, or corolla.
Sempervirens. Living through the winter, and retaining its leaves.
Sepal. A leaf of the calyx.
Serrate. Notched like the teeth of a saw.
Serrulate. Minutely serrate.

- Sessile.* Sitting down; placed immediately on the main stem without a foot stalk.
- Seta.* A bristle.
- Seta'ceous.* Bristle-form.
- Shaft.* A pillar, sometimes applied to the style.
- Sheath.* A tubular or folded leafy portion including within it the stem.
- Shoot.* Each tree and shrub sends forth annually a large shoot in the spring, and another in June.
- Shrub.* A plant with a woody stem, branching out nearer the ground than a tree, usually smaller.
- Siccus.* Dry.
- Silicle.* A seed vessel constructed like a silique, but not longer than it is broad.
- Silique.* A long pod or seed vessel of two valves, having the seed attached to the two edges alternately.
- Simple.* Not divided, branched, or compounded.
- Sinuate.* The margin hollowed out resembling a bay.
- Sinus.* A bay; applied to the plant, a roundish cavity in the edge of the leaf or petal.
- Sori,* (plural of *Soros.*) Fruit dots on ferns.
- Spathe.* An elongated receptacle of flowers, commonly proceeding from a spathe.
- Spatha.* A sheathing calyx opening lengthwise on one side, and consisting of one or more valves.
- Spatulate.* Large, obtuse at the end, gradually tapering into a stalk at the base.
- Species.* The lowest division of vegetables.
- Specific.* Belonging to a species only.
- Sperma.* Seed.
- Spike.* A kind of inflorescence in which the flowers are sessile, or nearly so, as in the mullein, or wheat.
- Spikelet.* A small spike.
- Spindle-shaped.* Thick at top, gradually tapering, fusiform.
- Spine.* A thorn or sharp process growing from the wood.
- Spinous.* Thorny.
- Spiral.* Twisted like a screw.
- Spur.* A sharp hollow projection from a flower, commonly the nectary.
- Spur-red-rye.* A morbid swelling of the seed, of a black or dark colour, sometimes called ergot; the black kind is called the malignant ergot. Grain growing in low moist ground, or new land, is most subject to it.
- Squamous.* Scaly.
- Squarrose.* Ragged, having divergent scales.
- Stamen.* That part of the flower on which the artificial clasps are founded.
- Staminate.* Having stamens without pistils.
- Standard.* See Banner.
- Stellate.* Like a star.
- Stem.* A general supporter of leaves, flowers, and fruit.
- Stemless.* Having no stem.
- Sterile.* Barren.

- Stigma.* The summit, or top of the pistil.
- Stipe.* The stem of a fern, or fungus; also the stem of the down of seeds, as in the dandelion.
- Stipitate.* Supported by a stipe.
- Stipule.* A leafy appendage, situated at the base of petioles, or leaves.
- Stoloniferous.* Putting forth scions, or running roots.
- Stramineous.* Straw-like, straw coloured.
- Strap-form.* Ligulate.
- Stratum.* A layer, plural strata.
- Striate.* Marked with fine parallel lines.
- Strictus.* Stiff and straight, erect.
- Strigose.* Armed with close thick bristles.
- Strobilum.* A cone, an ament with woody scales.
- Style.* That part of the pistil which is between the stigma and the germ.
- Stylides.* Plants with a very long style.
- Sua'vis.* Sweet, agreeable.
- Sub.* Used as a diminutive, prefixed to different terms to imply the existence of a quality in an inferior degree; in English, may be rendered by somewhat: it also signifies under.
- Suberose.* Corky.
- Submersed.* Growing under water.
- Subterraneous.* Growing and flowering under ground.
- Subtus.* Beneath.
- Subacute.* Somewhat acute.
- Subsessile.* Almost sessile.
- Subulate.* Awl-shaped, narrow and sharp pointed. See Awl-form.
- Succulent.* Juicy; it is also applied to a pulpy leaf, whether juicy or not.
- Succus.* Sap.
- Sucker.* A shoot from the root, by which the plant may be propagated.
- Suffruticose.* Somewhat shrubby; shrubby at the base; an under shrub.
- Sulcate.* Furrowed, marked with deep lines.
- Super.* Above.
- Supradecomposed.* More than decomposed; many times sub-divided.
- Superior.* A calyx or corolla is superior, when it proceeds from the upper part of the germ.
- Supernus.* Face upwards. See Resupinatus.
- Suture.* The line or seam formed by the junction of two valves of a seed vessel.
- Sylvestris.* Growing in woods.
- Syncarpe,* (from *sun*, with, and *karpos*, fruit.) A union of fruits.
- Syngenesious.* Anthers growing together, forming a tube; such plants as constitute the class Sygenesia, being also compound flowers.
- Synonyms.* Synonymous, different names for the same plant.
- Synopsis.* A condensed view of a subject, or science.

T.

Taxonomy, (from *taxis*, order, and *nomus*, law.) Method of classification.

Tegens. Covering.
18*

Tegument. The skin or covering of seeds; often burst off on boiling, as in the pea.

Temperature. The degree of heat and cold to which any place is subject, not wholly dependent upon latitude, being affected by elevation; the mountains of the torrid zone produce the plants of the frigid zone. In cold regions white and blue petals are more common; in warm regions, red and other vivid colours; in the spring we have more white petals, in the autumn more yellow ones.

Tendril. A filiform or thread-like appendage of some climbing plants, by which they are supported by twining round other objects.

Tenellus. Tender, fragile.

Tenuifolius. Slender leaved.

Tenuis. Thin and slender.

Terete. Round, cylindrical, tapering.

Terminal. Extreme, situated at the end.

Ternate. Three together, as the leaves of the clover.

Tetradynamous. With four long, and two short stamens.

Tetrandrous. Having four stamens.

Thorn. A sharp process from the woody part of the plant; considered as an imperfect bud indurated.

Thread-form. See Filiform.

Thyrse. See Panicle.

Tige. See Caulis.

Tinctorius. Plants containing colouring matter.

Tomentose. Downy; covered with fine matted pubescence.

Tonic. (from *tono*, to strengthen.) Medicines which increase the tone of the muscular fibre.

Toothed. See Dentate.

Trachea. Names given to vessels supposed to be designed for receiving and distributing air.

Transverse. Crosswise.

Trichotomous. Three forked.

Trifid. Three cleft.

Trifoliate. Three leaved.

Trilobate. Three lobed.

Trilocular. Three celled.

Truncate. Having a square termination, as if cut off.

Trunk. The stem or bole of a tree.

Tube. The lower hollow cylinder of a monopetalous corolla.

Tuber. A solid fleshy knob.

Tuberous. Thick and fleshy, containing tubers, as the potato.

Tubular. Shaped like a tube, hollow.

Tunicate. Coated with surrounding layers, as in the onion.

Truncate. Shaped like a top or pear.

Twining. Ascending spirally.

Twisted. Coiled.

U.

Uliginosus. Growing in damp places.

Umbel. A kind of inflorescence in which the flower stalks diverge from one centre, like the sticks of an umbrella.

Umbelliferous. Bearing umbels.

Unarmed. Without thorns or prickles.

Uncinate. Hooked.

Unctuosus. Greasy, oily.

Undulate. Waving serpentine, gently rising and falling.

Unguis. A claw.

Unguiculate. Inserted by a claw.

Uniflorus. One flowered.

Unicus. Single.

Unilateral. Growing on one side.

Urceolate. Swelling in the middle, and contracted at the top in the form of a pitcher.

V.

Valves. The parts of a seed vessel into which it finally separates, also the leaves which make up a glume or spatha.

Variety. A subdivision of a species distinguished by character which are not permanent; varieties do not with certainty produce their kind by their seed. All apples are but varieties of one species; if the seeds of a sour apple be planted, perhaps some will produce sweet apples.

Vaulted. Arched over; with a concave covering.

Veined. Having the divisions of the petiole irregularly branched on the under side of the leaf.

Ventricose. Swelled out. See Inflated.

Vernal. Appearing in the spring.

Verrucose. Warty, covered with little protuberances.

Vertical. Perpendicular.

Verticillate. Whorled, having leaves or flowers in a circle round the stem.

Vesicular. Made up of cellular substance.

Vesperine. Flowers opening in the evening.

Villosus. Hairy, the hairs long and soft.

Violaceus. Violet coloured.

Virescens. Inclining to green.

Virgate. Long and slender. Wandlike.

Viridis. Green.

Virgultum. A small twig.

Vitrose. Nauseous to the smell; poisonous.

Viscid. Thick, glutinous, covered with adhesive moisture.

Vitelus. Called also the yolk of the seed; it is between the albumen and embryo.

Vitreus. Glassy.

Viviparus. Producing others by means of bulbs or seeds germinating while yet on the old plant.

Vulnerary. (from *vulnus*, a wound,) medicines which heal wounds.

W.

Wedge-form. Shaped like a wedge, rounded at the large end, obovate with striated sides.

Wheel-shaped. See *Rotate*.

Whorled. Having flowers or leaves growing in a ring.

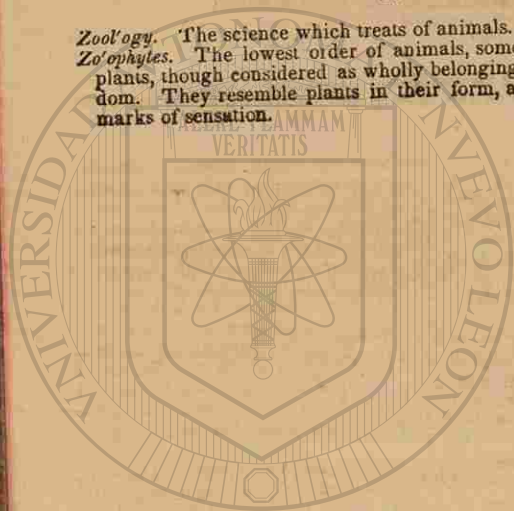
Wings. The two side petals of a papilionaceous flower.

Wood. The most solid parts of trunks of trees and shrubs.

Z.

Zoology. The science which treats of animals.

Zoophytes. The lowest order of animals, sometimes called animal plants, though considered as wholly belonging to the animal kingdom. They resemble plants in their form, and exhibit very faint marks of sensation.



LANGUAGE OF FLOWERS.

Mankind in all ages have delighted to personify flowers, to imagine them as possessing moral characters corresponding with their outward appearance;—thus we speak of the modest violet, the humble daisy, the proud tulip, and the flaunting peony. In those nations where the imagination is lively, and leads men to the use of figurative language, flowers are often made to speak the sentiments of the heart, in a manner more delicate and impressive than could be done by words.

Even with us, who are not a people remarkable for brilliancy of fancy, flowers form an interesting medium of communication, and often awaken tender recollections. When our parlours or gardens show us these living witnesses of a friend's kindness or affectionate remembrance, we feel a pleasing emotion steal upon our hearts. A shrub or tree presented us, by a departed friend, is a perennial monument to his memory, more touching to the heart than an inscription on marble.

It is a fact which may ever be noticed, that those who love flowers are social in their tastes, and delight to share their enjoyments with others. In a sordid love of money, we see the reverse of this; here, so far from the wish to communicate to others, the heart seems to become more and more dead to sympathies and benevolence. We should seek to improve our affections and to calm our spirits by such pursuits as seem best calculated to produce this effect. Hence, we may indulge a fondness for flowers, as not only innocent, but favourable to the health of the soul.

Among the ancients, flowers were used in their religious celebrations. Christians, even to this day, decorate their churches with flowers and evergreens in seasons of peculiar solemnity.

In many countries the dead are decked with flowers for their burial, and the tombs are ornamented with garlands and festoons. Thus Mrs. Hemans says:

“Bring flowers, pale flowers, o'er the bier to shed,
A crown for the brow of the early dead!
For this, through its leaves has the white rose burst,
For this in the woods was the violet nurs'd;
Though they smile in vain for what once was ours,
They are love's last gift—bring flowers, pale flowers.”

The bride of almost every nation is adorned with flowers; the rose and orange blossom are among the favourites for this purpose.

Wheel-shaped. See *Rotate*.

Whorled. Having flowers or leaves growing in a ring.

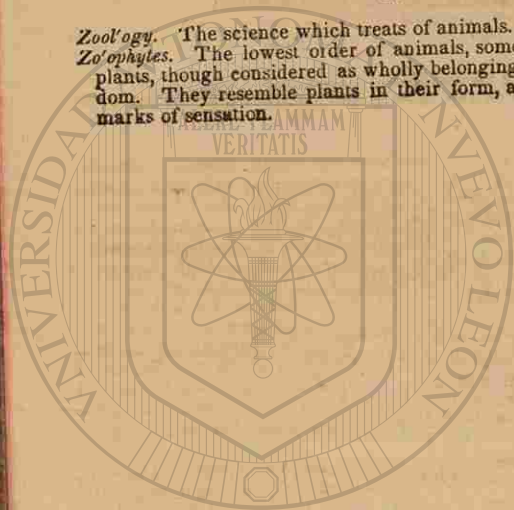
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The infant loves flowers, and the young child when he first goes into the fields and plucks the luxuriant wild flowers, exhibits a delight which the most costly toys cannot impart.

We will now give a few examples of attaching sentiments to flowers; and should the young reader become so much interested in this, as to wish to pursue the subject, we will recommend him to peruse the article, "Symbolical Language of Flowers," in the Familiar Lectures on Botany, and the more full explanation is to be met in "Flora's Dictionary," and "Flora's Interpreter."

Acacia, Friendship.
Acanthus, Indissoluble ties.
Aconitum, (Monk's-hood,) Deceit.
Amaranthus, Unchanging.
Amaryllis, Coquetry.
Anemone, Frailty.
Aram, (Wild-turnip,) Ferocity.
Aster, Beauty in retirement.
Asclepias, (Milk-weed,) Hope.
Bachelor's button, Hope, even in misery.
Balm, How sweet is social intercourse!
Broom, Humility.
Broom-corn, Industry.
Balsamine, (Lady's slipper of the garden,) Impatience.
Bay, I change but in death.
Bee, Constancy.
Bell-flower, Gratitude.
Cardinal flower, High station does not confer happiness.
China aster, I return your affection.
Chrysanthemum, (White,) Truth needs no protestations.
Clematis, (Virgin's bower,) Mental excellence.
Cock's-comb, Foppery, Affectation.
Convolvulus, Uncertainty.
Crown imperial, Great but not good.
Chamomile, Blooming in sorrow.
Carnation, Disdain.
Daisy, Unconscious beauty.
Dandelion, Smiling on all.
Heart's-ease, (Garden violet,) Forget-me-not.
Hollyhock, Ambition.
Honeysuckle, Fidelity.
Houstonia, Innocence.
Hydrangea, Boastful.
Jasmine, Gentle.
Iris, A message for you.
Larkspur, Inconstant.
Lily, (White,) Purity.
Lily of the Valley, Delicacy.
Marigold, Cruelty.
Mirabilis, (Four o'clock,) Timidity.
Mignonette, Beauty in the mind rather than the person.
Mock Orange, (*Philadelphus*,) Counterfeit.

Myrtle, Love.
Narcissus, Selfishness.
Olive, Peace.
Orange flowers, A bridal.
Parsley, Useful knowledge.
Passion flower, Devotion.
Pink, single, A stranger to art.
Pink, variegated, Refusal.
Peony, Orientation.
Poppy, Forgetfulness.
Rosemary, Remembrance.
Rosebud, A confession.
Rose, wild, Simplicity.
Rose, cinnamon, Without pretention.
Sage, Domestic virtues.
Snow-drop, I am not a summer friend.
Strawberry, A pledge of happiness.
Sweet William, Artful.
Sweet pea, Departure.
Tulip, Vanity.
Weeping willow, Forsaken.

The following lines, written on seeing a splendid collection of Water Lilies on the shores of Saratoga Lake, may convey to the young reader a useful moral.

Here on this gently sloping bank
 Of mossy flowers, I love to lie;
 While round, the vernal grass so rank,
 Of green, reflects the richest dye.
 The placid lake of silver sheen,
 Fans with soft breath my burning cheek,
 While from its bosom all serene,
 Fresh odours rise from blossoms meek.

Sweet, modest plants, condemned to dwell
 In solitude and lonely shade;
 Oh, do you not sometimes rebel,
 That thus obscure your lot is made?
 But come with me to fairy bowers,
 Deck'd by the tasteful hand of art;
 And ye shall know of brighter hours,
 And share the pleasures of my heart.

Nymphaea* hears my earnest plea,
 Meek, white-robed lily of the lake;
 And waiving forth a sigh to me,
 The unambitious flowret spake.
 Mortal, forbear! thou knowest not
 How idle is thy foolish dream;—
 Nor is our lowly, humble lot,
 Sad as thy erring heart may deem.

* The White water-lily.

Round us the silver trout do glide.
 Bathe zephyrs dance amidst our bowers,
 And with us insects gay abide,
 Who call us sweetest of the flowers.
 We make these solitudes rejoice,
 Adorn and bless our parent wave;
 And should it be her children's choice
 To leave her, but—to find a grave?

We should not be in bowers of art,
 Blooming and fresh as we are here—
 Soon would our loveliness depart
 And wither'd things we should appear.
 See yellow Nappar* now so gay,
 Blue Pontederia fresh and fair,
 Oh, they would droop the very day,
 Should take them from their natal air!

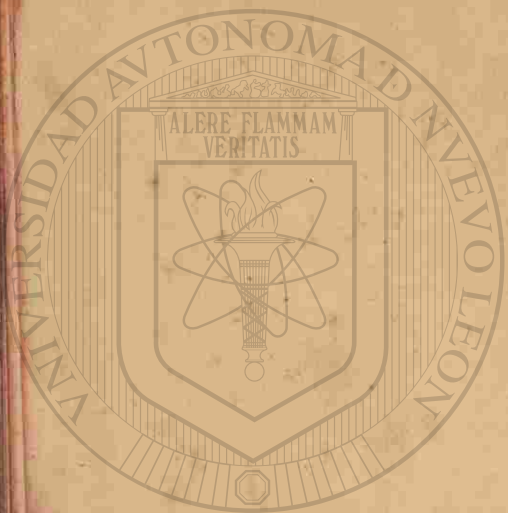
And I, she said, in accents sweet,
 Whose robe of plain and simple white
 Is for these shades a garment meet—
 I could not bide the glaring light,
 Which gaudy tulips love so well—
 Oh grant me, Heav'n my little day
 Untouch'd by pride may pass away!

*The Yellow water-lily
 † A beautiful aquatic flower with blossoms thickly crowded upon a spike; the
 tower intermixed with the White and Yellow lilies, produces a fine effect



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