TORREY'S
MEDICAL BOTANY.
A

Medical Botany

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Outlines of Botany:
Structural, physiological, systematical and medical

1. Structural and Physiological Botany

1. Plants consist of a hygrometrical membranous transparent tissue, chemically composed of oxygen, hydrogen, carbon of nitrogens. They also contain many mineral substances derived from their food of deposited in their tissues.

2. Their component parts are held together by an organic mucil, out of which this tissue itself is generated.

There are five kinds of tissues, viz: cellular, woody, vascular pitted, and heteroceros, each of which has certain modifications, constituting the Elementary Organs.

1. Elementary Organs.

3. Of these Cellular Tissues is the only form universally found in plants.
4. This is composed of vessels, the sides of which are not originally perforated by visible pores.
5. Each vessel is a distinct individual, adhering with the vessel with which it is in contact, and originating in a primitive point or cytotblast.
6. The membrane therefore that divides two contiguous cells is necessarily double. If the adhesion be imperfect, the spaces between the cells are called intercellular passages.
7. The sides of cellular tissue are often thickened by deposit,
Elementary Organs.

on their inner surface, of matter of lignification or seleragen, \( \text{\textcopyright}\) which is stratified, and often pierced with passages leading to the circumference.

9. The cells contain fluid; granules of coloring matter (chlorophyll); starch in granules; and crystals, which, when acicular, are called raphides.

10. The vessels of cellular tissue, when slightly pressed together, acquire a dodecahedral appearance, with an hexagonal section; stretched lengthwise they become prismatical, cylindrical fusiform, etc.

11. Cellular tissue, also called Parenchyma, constitutes all the pulpy parts; the medulla or pith, the medullary rays, a portion of the bark of the material between the veins of the leaves. It sometimes acquires excessive hardness by the deposit of seleragen.

12. Fusiform cellular tissue, is called protoxenchyma.

13. The function of cellular tissue is to transmit fluids in all directions; the membrane of which it is composed is therefore permeable, though not in general furnished with visible pores.

14. Cellular tissue is self-productive, one cell generating another upon its surface, from cytoplasm, produced in the organic nurse.

15. Pitted Tissue (Bothrenchyma), is a modification of the cellular, either consisting of cylindrical cells placed end to end, opening into each other; or originally tubular. Its sides are marked with pits, resembling dots produced in consequence of the seleragen being deposited unequally over the inside of the cells. Its office is to convey fluids with rapidity in the direction of the woody tissues that surrounds it.
Woody Tissue (Pleurechyma) consists of elongated tubes, tapering to each end, and, like the vessels of cellular tissue, innervate to the eye. From that tissue it is distinguished by its cylindrical form, great length, extreme fineness, and toughness.

17. It constitutes the chief substance of wood, and is found in the parenchyma of the fibers and in the veins of the leaves, or other appendages of the axis. Its functions are to give strength to the vegetable fabric, and serve for the passage of fluids from below upward.

18. Vascular Tissue (Trachenchyma) consists of very thin-walled cylinders, tapering to each end, and having a spiral fibre generated within.

19. They are found in the medullary sheath and in all the parts that proceed from it, especially the veins of the leaves, petals, etc., but are usually absent from the wood and bark.

20. They seem to be intended for the conveyance of air.

21. Ducts are transparent tubes, the sides of which are marked with rings, bars, or transverse streaks.

22. They are slight modifications of the spiral vessels, differing principally in being incapable of unwinding, and, in some cases, in the turns of the spiral being distant or broken.

23. They occur among the woody tissue of herbaceous plants, if in the wood of ferns of lycopodiums; also in the loose cellular tissue at the extremity of roots. Their functions are not well known.

24. Suctiferous Tissue (Cinchenchyma) consists of uninterrupted anastomosing tubes, the
Elementary Organs

final divisions of which are extremely delicate. It forms the proper vessels of old writers. It conveys latex, a peculiar fluid, usually turbid, and colored red, white, or yellow, often, however, colorless.

25. It principally occurs in the leaves of Exogons, whence the ramifications proceed to the surface of all the organs, by penetrating the hairs, where they form a most delicate net-work.

26. The use of this tissue is to carry the latex to all the newly formed organs, which are supposed to be nourished by it.

27. These five kinds of tissue, with their modifications, are the only forms known. Air vessels, Reservoirs of oil, Lenticular glands, are all either distended intercellular passages, or cavities built up with cellular tissue, or large cells filled with peculiar secretions.

28. All these forms of tissue are enclosed within a skin called Epidermis, which is made up of one or more layers of parenchyma, the vessels of which are compressed, in a firm state of cohesion. It is spread over all the parts of plants which are exposed to the air, except the stigma and parts habitually living under water.

29. It is itself by an extremely thin pellicle called cuticle, which covers every part except the opening through the stomates.

30. Stomates are oval spaces lying between the sides of the cells, opening into intercellular spaces in the subjacent tissue, and appearing to be bordered by a limb when viewed from above. This appearance is owing to the juxtaposition of 2 elastic vessels, closing up or opening the aperture, which they form.

31. They are found abundantly upon the leaves, particularly on the lower surface, occasionally also on organs that are modifications
Compound Organs.

of leaves; on the stems. They have not been found on the roots, nor in colorless parasitical plants, nor the submerged part of plants; they are, moreover, rare, or altogether absent, in succulent plants and in seeds.

32. The function of stomata is to regulate evaporation and respiration.

33. Hairs are minute expansions of transparent cellular tissue. They are of two kinds, lymphatic & secreting.

34. Lymphatic hairs are formed by vessels of cellular tissue placed end to end, if not much varying in dimensions.

35. Glandular hairs are formed by vesicles of cellular tissue placed end to end, if densely dilated at the apex or base into receptacles of fluid.

36. Lymphatic hairs are for the absorption of moisture & for the protection of the surface on which they are placed.

37. Glandular hairs are receptacles of the fluid peculiar to certain species of plants; as in the sweet-brier & nettles. They may be regarded as organs of excretion.

38. Tickle are conical hairs of large size, with very hard tissue.

II. Compound Organs.

39. These are formed of peculiar combinations of the elementary organs, & consist of the axis and its appendages.

40. The axis is formed from an embryo or leaf bud, by the development of a root in one direction, & of a stem in the opposite direction.

41. An embryo is a young plant produced by the agency of
Stamens and pistils and developed within a seed.

42. A leaf-bud is a young plant, produced without the agency of stamens or pistils, enclosed within rudimentary leaves called scales, and developed on a stem.

43. An embryo propagates the species, a leaf-bud the individual.

44. When the vital action of an embryo or bud is excited, the tissue develops in three directions, upwards, downwards and horizontally.

45. That part which develops downwards is called the descending axis or root; that upwards, the ascending axis or stem; that horizontally, the medullary system; and the part from which the two axes start is called the crown, or collar.

46. In the lower tribes of plants, however, the development is often in only one or two directions.

III. Root.

47. The root is formed by the descending and dividing fibres of the stem, from which it differs anatomically in the absence of normal buds, and of stamens (30), and in Exogens, of pith.

48. Although the root has no distinct pith in Exogens, yet it possesses a distinct medullary system.

49. The functions of the root are to fix plants in the earth, to absorb nutriment from it, y to lengthen exclusively by successive additions to the points of its divisions.

50. Absorption in the roots takes place almost exclusively by the extremities called spongioids or spongioles, which consist of a lax coating of cellular tissues lying upon a concentric layer of woody tissues, in the midst of which is often placed a bundle of ducts.
V1. **Stem.**

51. Most thick roots contain stores of nutritious matter upon which the young stem feeds. They must not be confounded with rootstock or corns, which are forms of stems.

IV. **Stem.**

52. The stem is produced by the successive development of leaf buds (42), which lengthen in opposite directions.

53. The matter which causes the increase of exogenous plants depends from the leaf buds; the greater the number of these buds above a part the greater the diameter of that part.

54. In the spring the newly forming wood is to be traced in the form of organic fibres descending from the leaf buds; that which is most newly formed lying on the outside, and proceeding from the most newly developed buds.

55. The elongation of buds upwards gives rise to new axes, with their appendages; their elongation downward increases the diameter of that part of the axis which preceded, and produces roots.

56. The root, therefore, consists of extensions of woody tissues; it has no proper leaf-buds of its own.

57. The leaf-buds thus successively held together developed, are held together by the medullary system of the stem, which proceeds from the bark inwards, connecting the circumference with the centre.

58. The varies in structure in four principal ways: It is either formed of by successive additions to the outside of the wood, when it is called *Exogenous*; or by successive additions to its centre, when it is called *Endogenous*; or by the union of the bases of the leaves, and by additions to the point of the axis, or by simple elongation or expansion when no leaf-buds exist; this is called *Aerogenous*.

59. In what are called *Dictyogens*, the stem has the structure of *Exogens* and the root that of *Exogens* nearly; e.g. *Siliquastrum*.
60. The stem of Exogens may be distinguished into the Pit, the Medullary Sheath, the Wood, the Bark, and the Medullary Rays.

61. The Pit consists of cellular tissue, occupying the centre of the stem. It occasionally contains scattered spiral vessels. It is produced by the elongation of the axis upwards.

62. It serves to nourish the young buds until they are able to procure nourishment for themselves. For this purpose, it is filled with starch, which becomes changed into mucilage, and passes into the base of the organs. When it has performed this office, it dies.

63. The Medullary Sheath consists of spiral vessels. It immediately surrounds the pit, and projections of which pass through it into the medullary rays. It is in direct communication with the leaf-buds and the veins of the leaves.

64. It carries up the oxygen liberated by the decomposition of carbonic acid and water, and conducts it into the leaves.
65. The Wood lies upon the medullary sheath, and consists of concentric layers.

66. It is formed by successive deposits of organized matter descending from the buds, and by the interposition of the medullary system, here called medullary rays, connecting the pith and the bark.

67. The first concentric layer lies immediately upon the medullary sheath and pith; it consists of woody of vascular tissue. Each succeeding concentric layer, consists of woody of vasiform tissue, which, either form themselves into distinct strata, in which case the latter is innermost, or are confounded together.

68. Each concentric layer, once formed, never altered in dimensions. Each concentric layer is usually the produce of one year's growth by the number of concentric circles of wood should determine the age of an Exogenous tree. But disturbing causes often render the rule uncertain; so in warm countries, the period of rest is not distinctly marked.

69. The secretions of plants are mostly deposited in the oldest concentric layers; and when the tissues of the layers is filled with secretions, it ceases to perform any vital functions.

70. The dead and fully formed central layers are called the heart-wood.

71. The living and incompletely formed external layers are called alburnum, or sap-wood.

72. Upon the outside of the wood lies the Bark, which, like the wood, consists of concentric layers.

73. It consists of four distinct parts: 1. Epidermis; 2. Epiphloem; 3. Mesophloem; 4. Liber; each of which increases by successive additions to its own inside, except the Epidermis.
74. The Epidermoid of Mesophylleum are both formed of cellular tissues only; but their cells are placed in different directions with respect to each other. The former is often soft and may separate spontaneously from the young layers forming beneath it, as in Cork.

75. The Libe consists of cellular tissues, laticiferous types, and woody tissues. The tubes of the last are often thickened by a deposit of sedimentary matter, so that sections of them appear like concentric circles. Hence arises the toughness of the woody fibre in bark of the use of Libe for cordage.

76. The secretions of a plant are often deposited in the bark in preference to any other part. Hence the medicinal principles are often to be sought in the bark, rather than in the wood.

77. The immediate functions of the bark are to protect the young wood from injury, and to serve as a filter through which the descending elaborated juices of a plant may be transported horizontally into the stem, or downwards into the root.

78. It also contains the laticiferous vessels, by which the latex is conveyed to all parts of the surface of a plant.

79. The Medullary Rays consist of compressed parallelograms of cellular tissues (musiform ... ) belonging to the medullary system. These rays or plates form the silver grain of wood. They connect together the tissues of the trunk, maintaining a communication between the centre and the circumference.

80. They convey secreted matter horizontally from the bark to the heart-wood; and they generate adventitious buds.

81. Cambium is a viscous secretion, which in the spring separates the albumen of an exogenous plant from the Libe, out of which the new elementary organs are formed.
Stem.

52. The stem of Endogenous plants offers no absolute distinction of Pith, medullary Rays, Pith & Bark; but is formed by the intermixture of bundles of vascular tissue, among a mass of cellular tissue, the whole of which is surrounded by a zone of cellular & woody tissue, inseparable from the stem itself and therefore not bark.

53. It increases by the successive descent of new bundles of fibro-vascular tissue down into the central cellular tissue, coming towards the circumference as they descend.

54. The vascular bundles of the centre gradually force outward those which were first formed, the cellular mass augments simultaneously, & in this way the diameter of a stem increases.

55. What appears to be bark in Endogenes is an external layer of cellular tissue into which the lower extremities of the fibro-vascular tissue descend obliquely, losing their vascularity as soon as they reach the spurious bark.

56. The diameter of an Endogenous stem is determined by the power of tissue passages of distending, and by its bending.

57. When the external tissue has once become indurated, the stem can increase no further in diameter.

58. Generally the terminal bud only of Endogenous plants is developed; but very often a considerable number develop: Ex. Asparagus. In the former case it is cylindrical; the latter, conical.

59. In Acrogenes the stem is formed by the simple union between the bases of the leaves of the original axis of the bud from which they spring, and which they carry up along with them. Ex. Ferns.

60. When Acrogenes have no proper leaves, they are mere expansions of cellular matter, sometimes in all directions; Ex. Fungi; sometimes in particular directions; Ex. Lichens, &c.

61. The stem assumes numerous and very different appearances in different plants.
92. Many forms of stem are vulgarly called roots; such as
the Rhizome or rootstock, which creeps upon, or under
the earth, emitting roots from its under side; tubers, which
are produced by a thickening of the internodes of the stem,
which narrows the underground extension of the stem.

93. No root can have either scales (which are rudiment
of leaves), or nodes (which are rudiments of buds).

94. The ascending axis, or stem, has nodes and inter-
nodes. Nodes are the places where the leaves are expanded
by the buds from; internodes are the spaces between the
nodes.

95. Whatever is produced by the evolution of a leafbud
is a branch.

96. A spine is an imperfect evolution of a leafbud.

V. Leaf-buds.

97. Buds are of two kinds: Leaf-buds and Flower-buds.

98. Leaf-buds consist of rudimentary leaves sur-
rounding a growing vital point, the tissue of which is
capable of elongation, upwards in the form of a stem
and downward in the form of root.
Leaf buds.

99. Flower buds consist of rudimentary leaves surrounding a fixed vital point, y assuming, when fully developed, the form of floral envelopes, or the apparatus of stamens and pistils.

100. The two kinds of buds sometimes show a tendency to change into each other.

101. Within the scales of a leaf-bud is a center of cellular substance, coated with a thin stratum of spiral vessels, of these two parts answer to the pith of medullary rays in Exogens.

102. By the growth of a leaf-bud, a branch is formed; and the scales gradually change into true leaves as vegetation advances.

103. Bulbs or leafy bulbs, are merely underground buds of large size filled with nutriment.

104. In the axils of the scales of bulbs, young buds, or bulblets (clones) are often formed as in Garlic, and then gradually destroy the old bulb by feeding upon it. In like manner corns produce other corns at the axil of their scales, y are destroyed by their offspring.

( The figure represents a corn of Gladiolus with the vestiges of preceding corns at its base.)

The Colchicum bears its parent in the form of a shrivelled spongy lump on one side of its base, while on the opposite side a new bud is prepared, by which the parent will hereafter perish.
Leaf-buds.

105. Leaf-buds are of two kinds, the regular and adventitious.

106. Regular or normal leaf-buds are only found in the axils of leaves. They exist in a developed or undeveloped state, in the axils of all leaves, or of all modifications of leaves.

107. Leaf-buds which are formed among the tissue of plants subsequently to the development of the stems and leaves, are called latent, adventitious, or abnormal.

108. Adventitious leaf-buds are formed in the root, among the wood, at the margins or on the surface of the leaves.

109. Embryos are woody nodules found in the bark of trees, and apparently rudimentary branches formed without leaves from being forcibly pressed upon by the surrounding tissues.

VI. Leaves.

110. A leaf is an expansion of the bark immediately below the origin of a regular leaf-bud.

111. Leaves are developed alternately, one above and opposite the other, around their common axis, but sometimes, in consequence of the internodes being unequally developed, leaves become opposite, or verticillate.

112. A leaf consists of a petiole or stalk, a lamina, or blade, and a pair of stipules.

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alternate  opposite  verticillate

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Petiole

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Stipules

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Lamina
Leaves.

113. The **petiole** is the channel through which the vessels of the leaf are connected with those of the stem. It is formed of one or more bundles of spiral vessels and woody tissue, enclosed in a cellular integument, which is a continuation of that of the bark.

114. The spiral vessels of the leaf of Exogens derive their origin from the medullary sheath; those of Endogens from the bundles of fibro-vascular tissue.

115. When the petiole is leafy or the lamina abortive, it is called a phyllocladum.

116. When the petiole is dilated or hollowed out at its upper end, the small and articulated with the orifice, it is called a pitchers or asciidium if it is an enclosed sac, it is called an ampulla.

Pitcher of Nephenthes

Pitcher of Sarracenia

117. The **lamina** of a leaf is an expansion of the parenchyma of the petiole; it is traversed by veins which are ramifications or extensions of the bundles of vascular tissue of the petiole, or, when there is no petiole, of the stem.

118. Sometimes one, sometimes both the surfaces of a leaf are furnished with stomates.

119. In Exogens the veins usually branch in various directions among the parenchyma, forming a kind of net-work; while in Endogens they run parallel to each other, being connected by single transverse unbranched veins.

120. The principal vein of a leaf is a continuation of the petiole, y is called the midrib; its principal ramifications are called veins of the subdivisions of the lamina.

121. There are two strata of veins, the one belonging to the upper, the other to the under surface. The upper stratum conveys the juices from the stem into the lamina.
Leaves.

for the purpose of being aerated or elaborated; the under returns them into the bark.

122. The cellular substance of the leaf is often stratified beneath the two surfaces; the upper stratum being more compact than the lower by having its cells perpendicular to the plane of the leaf, in such cases the cells of the lower stratum are commonly more or less parallel with the under surface.

123. A leaf is simple when its lamina is undivided, or when, if it is separated into several divisions, these divisions do not reach the midrib.

124. The form of the simple leaf is extremely variable and the terms employed to denote the variations are numerous in proportion.

orbicular ovate lanceolate cordate oblong reniform oblique

peltate sagittate hastate angular wedge-shaped triangular

palmate seven-lobed pinnatifid sinuated pinnatifid
Leaves.

123. *Stipules* are attached to each side of the base of the petiole. They may be considered as rudimentary leaves, sometimes they are transformed into leaves.

124. Whatever arises from the base of a petiole or of a stipule leaf, attached to each side of it is a stipule.

125. When the margins of a stipule cloth a form a leaf surrounding the stem, it is called an oecium.

126. All leaves are originally continuous with the stem as they grow, an interruption of their tissues at their juncture with the stem takes place, by which a more or less complete articulation is at length formed. When complete, the tissues of the leaf become incessant by foreign matter, and when incapable of further action, it dies. The stem or branch continuing to increase in diameter of the dead leaf not increasing with it, the latter is thrown off. This is the fall of the leaf. In some Endogenous the articulation is so slight, if the stem increases so little in diameter, that the leaf is never thrown off, but simply withers if decayed.

127. The mode in which leaves are arranged within their buds is called varation.

128. Leaves base, under particular circumstances, the power of producing leaf buds from their margin.
VII. **Food and Secretions**

129. Plants are nourished by the absorption of food from the air or earth, in consequence of which they grow and produce their peculiar secretions.

130. The food of plants always consists of carabolic acid, nitrogen, water, or also of various mineral matters, chiefly alkaline, the nature of which varies with the species.

131. Carbon is obtained by plants in the form of carabolic acid, derived from the atmosphere, or generated in soil by the decay of vegetable matter.

132. Hydrogen is obtained principally by the decomposition of water, if it assimilated with carabolic acid, while the oxygen of the water is liberated.

133. Nitrogen can only be obtained by plants in the form of ammonia. This compound exists in every part of plant, in the roots, in the stem, in all blossoms and fruits, in an unripe condition. It is supplied by rain water which carries it down from the air, to which it is always present, being derived from the exhalation of plants and animals.

134. The ammonia being taken up by the roots, entering into the composition of the sap, its elements contribute to the formation of albumin, gluten of other compounds of which nitrogen is an ingredient.

135. It is important that the ammonia be presented to plants in a fixed state, or in the form of salts, otherwise most of it is lost, on account of its volatility.

136. Besides carabolic acid, water, and ammonia, plants require other materials for their growth (1).

137. One of the most important of these is phosphate of magnesia, which, in combination with ammonia, is an invariable constituent of the seeds of grass, including the various kinds of grass. Many plants also produce acids, which are necessary to their existence, if these acids require alkalies or earthy bases with which they may form.
Food and Secretions.

salts: The proportion of alkaline bases in a plant is indicated by the quantity of ash left after burning. If this varies in different species, consequently different species demand a different amount of alkaline food in the soil.

138. When alkaline matter is wanting, or deficient, in a soil, the growth of plants will almost be arrested, or impeded, in proportion to the deficiency.

139. Besides alkaline, plants require other substances, such as phosphoric acid, common salt, nitre, salt of iron & manganese &c., which are found in many species, & are probably essential to their healthy action, or even to their existence.

140. As soon as food is absorbed, it begins to ascend into the stem, or to diffuse itself through the system, & receives the name of sap.

141. In the course of the sap upwards, the water and carbonic acid are partially decomposed, & their elements are deposited, along with nitrogen in the interior of the fibers, forming a layer over the interior of every cell of vessels, which then become in part solidified.

142. As soon as the sap reaches the leaves, or the surface of the bark, green matter, or occasionally some other color, is formed, provided the part is exposed to the light. This matter seems to be produced from the elements of carbonic acid, ammonia of water, & the oxygen being restored to the atmosphere.

143. In the absence of light, plant absorbs oxygen from the atmosphere, & recombine it with the matter they contain, to be again liberated at the return of light. They also, at all other times, especially at night, part with carbonic acid in small quantities. It is chiefly light, in conjunction with vital force, that causes the decomposition of the matter contained in living plants.

144. In darkness no assimilation of the food takes place; oxygen accumulates, in natural proportion to the other elements is disarranged, the plant becomes bleached, & then dies.
145. From the continued assimilation of the elementary constituents of plants, new products result which serve for the formation of woody fibre and all solid matters of a similar composition. The leaves produce sugar, starch and acid, which previously, when necessary for the formation of stems, buds, leaves or branches, were formed by roots.

146. The motion of the sap upwards is caused by the newly developing leaf-buds, which, constantly consuming the sap that is near them, a fresh quantity being sent forward from the roots. The vessels which convey it possess a peculiar vital irritability.

147. The irritability of plants is also shown by other phenomena, such as sudden motion of the stems when touched, the collapse of many leaves when stimulated, &c.

148. After the sap has been distributed through the veins of the leaves, and exposed to the influence of air and light, it undergoes peculiar chemical changes. When these are accomplished it is called the proper juice.

149. The juice then flows back and descends towards the roots, passing also horizontally into the center of the stems.

150. Hence the great importance of leaving to plants the necessity of exposing them to the full influence of light and air.

151. In Exogenous plants ( ) the upward course of the fluids is through the young wood; their downward passage through the bark, towards or into the root; if their horizontal diffusion takes place through the medullary rays.

152. Hence the peculiar principles of the exogenous are, in trees of shrubs, to be sought either in the bark or in the heart-wood ( ), not in the albumen... In perennial herbaceous plants, the roots are the chief reservoir of the secretions; if in annuals, the stem and root of which last but a single season, the secretions are distributed equally through every part of the plant. In annuals, they are found in the greatest abundance at the end of their growth.
Flower-bud.

153. In Endogenous plants ( ) the upward course of the flower is probably through the bundle of vascular-woody tissues, or the downward of horizont or passage through the cellular tissues.

154. The precise direction of this safe in Azophyllum ( ) is unknown.

VIII. Flower-bud.

155. The Flower-bud consists of a fixed point surrounded by imbricated, rudimentary, or metamorphosed leaves, the external or inferior of which are usually alternate, if the internals or superior verticillate or opposite. The latter constitute the floral envelopes, stamens, & style.

156. The leaf, from the axis of which a flower bud arises is called a bract or floral-leaf; of all rudimentary leaves of what size or colour soever, which appear on the peduncle (150), between the floral leaf of the calyx (152) are called bracteoles.

157. When a single bract (usually large of color) is rolled together is placed at the base of that kind of inflorescence called a spadix (170), it is named aspatha.

158. Several bracts in a wheel, or imbricated, of those around those forms of inflorescence called umbell, or head constitute an involucre.

159. In grasses, sedges, of many other plants that are constituents of proper calyx & corolla, the bract (157) is partly or entirely by the aerial bract called glumes of palea. They are placed alternate with each other or not verticillate, late, as in true floral envelopes.

160. The axis of a flower-bud usually remain, only below the floral envelopes, forming a stalk which is called the peduncle. If this give off partial stalks of interval, it is called a racem, if the divisions are called pedicels.
Flower-bud.

161. A flower, with its peduncle of bracteoles, may be considered as a modified branch.

162. A flower's buds can only develop from the axil of a bract; a pedicel without bracteoles can never produce other flowers, but, if furnished with these organs, it can often do, bear several flowers.

163. The manner in which the floral organs are arranged before expansion, is called aestivation or prefloration by which the following are examples.

![valvate](image1) ![involute](image2) ![plicate](image3) ![induplicate](image4) ![imbricate](image5)

164. The modes in which the flower-buds are arranged on the plant are called the forms of inflorescence; of the order in which they unfold it is called the order of expansion.

**IX. Inflorescence**

165. The following are the principal kinds of inflorescence.

166. When no elongation of the general axis of a plant takes place beyond the development of a flower-bud, the flower is said to be terminal, solitary.

167. The flowers are called solitary if all are on a single bud unfolding in the axil of a leaf, the general axis continuing to lengthen.

168. A raceme is formed when a number of flower-buds, each on a pedicel, are produced on a common axis.

169. A spike differs from a raceme in the buds being without pedicels.

170. A spadix is a succulent axis, densely crowned with flowers, if surrounded by a spathe (157).

171. An amethystium or catkin is a spike, the bract glands are all of equal size, closely imbricated, if the rachis of either is articulate with the stem.
172. When a bud produces numerous flower-buds which are separate or closely aggregated into a head, that inflorescence is called a capitulum.

173. An umbel is formed, when the flowers are on along the peduncle, which all proceed from the same point of the axis.

174. A panicle is a raceme, the flower buds of which have produced other flower buds.

175. A raceme or panicle; the lower flowers of which have long pedicels, of the uppermost short ones, is a corymb.

176. A panicle, the middle branches of which are longer than those of the base or apex, is called a thyrsus.

177. When the panicle has the elongation of all its branches arrested, so that it assumes the appearance of an umbel, it is called a cyme.

178. When the axis of expansion is from below upwards, it is called centrifugal.

179. When the upper or central flowers open first, of those of the base or circumference last, the expansion is called centrifugal.
Inflorescence.

190. When the inflorescence is the result of the development of numerous branches, each particular branch follows the centrifugal law of expansion; but the whole mass of inflorescence is centrifugal. This arises from the partial centrifugal development commencing amongst the upper extremities of the inflorescence, instead of the lower.

191. The difference of expansion will therefore indicate whether the inflorescence proceeds from the buds of a single branch, when it is called simple, or of several branches, when it is called compound. When centrifugal, it is simple; when centrifugal, it is compound, although in appearance simple. This difference is often of great importance.

X. Floral Envelopes.

191. The Floral Envelopes are the parts that immediately surround the stamina and pistil.

192. They are formed of one or more whorls of modified leaves. From ordinary leaves they do not differ essentially, except in peculiar modifications of size or development.

192. When the envelopes consist of but one whorl of leaves, they are called calyx, whatever may be the color.

193. When there are two or more whorls, the outer is called calyx, the inner corolla. There is no other essential difference between the calyx and corolla.

194. Flowers without envelopes are called achlamydeous.

195. When the margins of the floral coverings are united the part where the union has taken place is named the tube, if the part that is separate is the limb.

195. The modified leaves that compose the calyx are called sepals. When they are distinct, the calyx is said
Floral Envelopes.

Floral Envelopes.

to be polypepalous; when they are more or less united by their margins, it is called monopetalous or gamopetalous.

superior inferior double spurred 2-lipped

196. The modified leaves of the corolla are called petals. They are usually of some bright color, different from that of the sepals. If not united with each other, they are said to be polypetalous; but if growing together more or less by their margins, the flower is called monopetalous or gamopetalous.

diplopetal

197. The corolla or calyx is 2-lipped, when the petals or sepals are united in two parallels.

198. If the petals or sepals are unequal in size, the calyx or corolla is called irregular.

199. If there be five petals, of which the uppermost one is dilated, the two lateral ones contracted, and parallel to each other, or if the two lower petals are united with each other by their front margins, the flower is Papilionaceous.

200. When a petal tapers towards its base, the narrow portion is called the tongue, or claw, of the upper part the limb. The former is analogous to the petiole, the latter to the lamina of a leaf.
Floral Envelopes.

of one row or whole of petals between the sepals and
those petals which are actually developed.

201. As petals always alternate with stamens, the number
of each row of either shall be the same. All deviations from
this law are either apparent only, in consequence of partial
cohesions, or, if real, are due to partial abortions.

202. Whatever intervenes between the bract (156) and
the stamens belongs to the floral envelopes, and is either cor-
olla or corolla, but many peculiar forms of the latter are
called nectaries ... These are

however, no exact limits
between the corolla and
the stamens, if there are
parts which may either
be regarded as stamens paling
into petals, or as petals paling into stamens.

XI. Stamens.

203. The whole or circle of organs immediately within
the petals, is composed of bodies called stamens.

204. Each of these bodies usually consist of two parts: the
filament of the anther.

205. The filament is composed of a bundle
of spiral vessels, surrounded by cellular tissue.
The anther is a terminal case containing a
peculiar arrangement of the same tissue by
finally opening by discharging its contents.

206. In many instances no limit can be traced between
the petals of stamens; as in the White Pond Lily, or Nymphs
In such cases the tend of the petals (195) contract and
become an anther, while the anthers assumes the form of
either filament.

207. Now as there are no limits between petals and sepals
nor between sepals of bracts (156), nor between bracts, leaves,
it also follows that the stamens are likewise modifications
of leaves.
Stamens.

208. The anther is a modification of the lamina of a leaf, of the filament of the petal.

209. When the stamens are twice as numerous as the petals, it is considered that two whorls are developed. If they are equal in number to the petals of opposite them, the inner whorl only is developed; the outer one being abortive.

210. All deviations from these laws are owing to the abortion of some part of the stamens.

211. When the stamens do not contract any adhesion to the sides of the calyx, they are hypogynous.

212. When they adhere to the side of the calyx, they are said to be perigynous.

213. If they are united both with the surface of the calyx and of the ovary, they are epigynous.

214. If of 4 stamens, two are long and two are short, they are called didynamous; or, when there are 6 stamens, four of which are longer than the others, they are tetradynamous.

hypogynous, perigynous, epigynous, didynamous, tetradynamous.

215. The filament are either distinct, or united by their margins. If they are united into one tube, they are called monadelphous; if in two parcels they are diadelphous; if in several, they are said to be polyadelphous.

216. When they are united in a solid body, along with the style, they form what is called a column, of are then gynandrous.

monadelphous, diadelphous, polyadelphous, gynandrous.

217. The filament of the stamen is often wanting; if these the anther is said to be &e; or &e;.

218. The substance found in the anther and finally discharged from it, is called pollen.
Stamens.

219. The two sides of the anther are called its lobes; the substance that connects them (which may be regarded as a continuation of the midrib) is named the connective.

220. The connective is sometimes articulated with the filament, across which it hangs, or on which it sways; in other cases it is forked & bears an anther lobe on each fork.

221. The cavities of the anthers containing the pollen are the cells of the place by which the pollen is emitted in the point or line of dehiscence; the membranous sides of the anther are named the valves.

222. Dehiscence usually takes place along a line, which may be regarded as the margin of the leaf out of which the anther is formed. Sometimes only a portion of this line opens, if then the anther is said to dehisc by forces.

223. Sometimes the sides of the anther separate along the connective as well as at the margin if unseen attached only at the top.

224. The cells of the anther are usually two, sometimes four; rarely several, or only one.

225. Sometimes the cells are folded or convoluted, or prolonged into tubes, &c.

226. The line of dehiscence is occasionally transverse.

227. When anthers grow together by their margins, they are called syngenesious.

228. The pollen is formed by a peculiar modification of the cells of the parenchyma of the anther. It consists of hollow cases, extremely small, containing a fluid in which float grains of starch or droplets of oil. It is furnished with apertures, through which its lining is protruded in the form of a delicate tube, where the pollen comes in contact with the stigma.
Stamens.

229. The shape of the pollen is variable; the more common forms are spherical, triangular, polygonal and oblong.

Forms of anthers.

230. The surface of the pollen is either smooth, or studded with little points.

231. The grains are usually distinct from each other, but in some cases they cohere in definite numbers; or in irregular masses; or are enclosed within a bag. When they cohere, they are connected by a process called the carpelike.

232. The function of the pollen is to fertilize the ovules.

Disk.

233. Whatever intervenes between the stamens of the pistil, receives the general name of disk. It usually consists of an annular elevation, encompassing the base of the ovary, when it is sometimes called the cup; or it appears in the form of glandular lining of the tube of the calyx (as in the Rose) or of tooth-like processes at the base of the ovary.

234. When a fleshy substance occupies the centre of a flower, or bears a single row of carpels, it is called the gynobase. If it bears more carpels than a single row, it is called the corolla or receptacle.
Pistils.

235. The disk is a non-developed inner row or rows of stamens. The Linnean botanists included it among the forms of the receptacle. The receptacle or torus is merely the growing point of a flower-bud in a state of enlargement.

XII. Pistils.

237. The organ that occupies the centre of the flower, within the stamens of disk, is called the pistil.

238. It is distinguished into three parts; viz., the ovary, the style, and the stigma.

239. The ovary is a hollow case containing one or more cavities, called cells, which enclose ovules (264).

240. The stigma is the upper extremity of the pistil.

241. The style connects the ovary of stigma. When it is absent, the stigma is said to be sterile. It usually proceeds directly from the apex of the ovary; but in some cases it arises from the side or even the base of that organ.

242. Strictly speaking, nothing is stigma but the naked eroding surface of the style.

243. The pistil is either a modification of a single leaf or of one or more whorls of modified leaves. Such modified leaves are called carpels.

244. A carpel is formed by a folded leaf, the upper surface of which is folded inward, the lower outward; and within which are developed one or more modified buds or ovules.

245. When the carpels are all distinct or are separable with facility, they are syncarpous; when they all grow into a solid body, they are actinomorphic.

246. The ovary is the lamina of that leaf; the style is an elongation of the midrib; the stigma is the more marked apex of the style. The part representing the pistile is usually wanting, but sometimes it is present and constitutes the stalk (theca, phore, or gynophore) of the carpels.
Pistils.

247. Where the margin of a folded leaf out of which the carpel is formed, meets of united, a development of cellular tissue sometimes takes place, forming what is called the marginal placenta.

248. Every such placenta, therefore, is composed of two parts; one of which belongs to one margin of the carpel, and the other to the other. In some cases, however, the placenta is a more developed of the centre of a bud.

249. As the carpels are formed by leaves turned inwards, their margins are necessarily turned towards the axis, if a placenta formed by the union of these margins will be invariably next the axis.

250. The normal position of the carpels is alternate with the innermost row of stamens, to which they are also equal in number; but this symmetry of arrangement is generally destroyed by the abortion or non-development of part of the carpels.

251. The carpels often occupy several whorls; in which case they are usually distinct from each other.

252. When the carpels are arranged round a convex receptacle (239), the exterior ones will be lowest; as in the Raspberry.

253. If they occupy the surface of a tube, or are placed when a concave receptacle, its exterior ones will be the uppermost.

254. When the carpels are developed, they are invariably opposite each other, of never side by side.

255. When carpels unite, those parts of their sides which are contiguous to each other grow together to form partitions between the cavities of the carpels. These partitions are called septa, or they are necessarily formed of two layers; but sometimes they are so intimately united that thelayers cannot be distinguished.

256. Such being the origin of division, it follows that: 1. All divisions are vertical, or never horizontal; 2. They are equal in number to the carpels, out of which the pistil is formed: 3. A single carpel can have no true division.

257. As the stigma is the point of the ovary, it will always alternate with the division, which are formed of the sides.
Pistils.

of the carpellary leaf

258. Sometimes the ovary is only one-celled, although formed of several carpellary leaves. This is caused by the leaves not being turned in towards the axis, but merely united at their edges, or only slightly inflected. The placenta are then said to be parietal. Occasionally they are diffused over the whole face of the pistil.

259. A one-celled ovary may also be formed out of several carpels by the obliteration of the sepals.

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260. The sepals, whose position is at variance with the foregoing laws are spurious.

261. Spurious sepals, denote their origin from various causes. They may have either a vertical or horizontal position.

262. When horizontal they are called phragmata, because formed by a distension of the lining of the ovary. If vertical, they are either projections from the back of the carpel, or are produced by a turning inward of its margins (h. i.)

263. If the ovary adheres to the sides of the calyx, it is called inferior. If the calyx is said to be superior. If it contracts adherence with the calyx it is called superior, y the calyx inferior.
XIV. Ovule.

264. The ovule is a body borne by the placenta; it destined to become a seed.

265. It is usually enclosed within an ovary (239); but in Conifera of Cycadaceae it is destitute of any covering, if it is exposed naked to the influence of the pollen. The stalk by which it is usually attached to the placenta is called the funiculus or rodeo-petiole.

266. The point of union of the funiculus of the ovule is the base of the latter of the opposite extremity is its apex.

267. The ovule consists of two sacs, one enclosed within the other, y of a nucleus within the sacs. The outer sac is the primina of the inner one the secundina.

268. The primina, secundina of nucleus are all connected with each other by a continuity of tissue, at some point of their surfaces.

269. The mouths of the two sacs usually contract into a small common aperture, called the foramen of the ovule, to which the apex of the nucleus is always applied.

270. When the ovule is straight, i.e. where the point of union of the two sacs y of the nucleus is at the base, while the foramen is at the opposite end, it is called orthotropous.

271. The relative position of the point of the ovule is often greatly changed at an early period of its growth, so that the place where the primina, secundina of nucleus are connected is at the apex, y the foramen is found at the base. Such an ovule is called anatropous.

272. When the ovule is folded upon itself, or curved round, so that the foramen approaches the base it is said to be campylotropous.

273. In anatropous ovules there is a vascular connection maintained between the base of the apex, by means of a cord or bundle of vessels, called a raphis. It may be considered as a continuation of the funiculus of adhering to the side of the primina. The expansion of the raphis once communicated with the sac of nucleus gives rise to the chalaza of the seed.
Ovule

274. When the raphe is very short, so that the funiculus is attached to the middle of the ovule, the beak now being at one end of the base at the other, the ovule is called amphitropous.

275. The normal position of the raphe is on that side of the ovule which is next the placenta.

276. Within the nucleus (267) is a cavity or bag, called the sac of the amnion, containing a fluid named the liquor amnios, among which the embryo is developed.

XV. Impregnation.

277. Impregnation is effected by contact between the pollen and the stigma.

278. The pollen emit a tube of extreme delicacy, which pierces the stigma & style, of passing downwards into the ovary enters the foramen of the ovule; having reached which, it comes into contact with the nucleus.
Impregnation.

279. This accomplished, the act of impregnation is over, a new body gradually appears in the sac of the ovum (278) and eventually becomes an embryo.

280. Great numbers of modifications of this phenomenon have been observed, but they all resolve themselves into these facts.

281. In plants, the ovules of which have no pericarpial covering, (Gymnosperms, 265) the pollen falls in the furrow of these sacs as if it had come in contact with the stigma.

282. If only one pollen tube enters an ovule, there is but one embryo formed in the seed. But if several pollen tubes pass into the same ovule, there may be several embryos in the same seed.

XVI. Fruit.

283. The fruit, in the strictest sense of the word, is the pistil armed at maturity, but the term is also applied to the pistil and floral envelopes taken together, whenever they are all united in one uniform mass. Hence whatever is the structure of the pistil, the same should be the structure of the fruit.

284. Sometimes a pistil with several cells produces a fruit with but one, as in the Oak, Hazelnut, and Cocoa Nuts. This arises from obliteration of part of the Cells.

285. At other times a pistil of only one or two cells, changes to a fruit having several. This may be caused by the formation of spurious disseminata, etc.

286. As the fruit is the maturation of the pistil, thought to indicate upon its surface some traces of a style, this is true in all cases, except in Gymnosperms (281) which have no ovary.

287. Hence the grains of corn, many other bodies that make the seeds, having traces of the remains of a style, cannot be seeds, but are minute fruits.

288. That part which was the ovary in the pistil, becomes the pericarp in the fruit.

289. The Pericarp consists of three parts; the outer coating called the epicarp, the inner lining called the endocarp, and the intermediate substance named the sarcocarp.
Fruit.

290. Sometimes these three parts are all readily distinguished, as in the peach; frequently however they form one uniform substance.

291. The base of the fruit is the part where it is joined to the peduncle. The apex is where the remains of the style are found.

292. The axis of the fruit is often called the columella; the space where two carpels unite is the commissure.

293. All fruits which are mere modifications of a single carpellary leaf ( ) have always a suture corresponding with the junction of the margins (or with the placenta), or often another corresponding with the midrib of the leaf: the former is called the ventral, the latter the dorsal suture.

294. If the pericarp neither splits nor opens when ripe it is said to be indehiscent; if it does split or open it is said to deliquesc, or to be deliquescant; if the pieces into which it splits are called the valves.

294. The deliquescence of the pericarp takes place in different ways: if it take place longitudinally or vertically, so that the line of deliquescence corresponds with the junction of the carpels, the deliquescence are divided; the cells remain closed at the back, if the deliquescence is called septicidal.

295. If it take place vertically, so that the line of deliquescence corresponds with the dorsal suture (293), the deliquescence remain united, the cells are opened at their back, if the deliquescence is called loculicidal.

296. When a separation of the pericarp takes place across the cells horizontally, the deliquescence is transverse or circumvallate.

![diagrams](septicidal, loculicidal, transverse)

297. If the deliquescence is effected by partial openings of the pericarp, it is said to take place by pores; as in the poppy.

298. Sometimes the cells remain closed, or separate from the axis (297), as in Umbelliferae.

299. Or the cells open or separate from the axis, which is formed by the cohesion of many placenta, which separate from
from the dispersion. At other times the dispersionwhere
at the axis of separate from the valves (337) or back of the
carpel.
300. All fruits are either simple or multiple. The former
formed from a single flower. The latter are formed out of
several flowers. I consist of masses of infefts, in a state of
adhesion: as in the Fig. Pine Apple & Mulberry.

301. Simple fruits are either the maturature of a single
 carpel (268), or of a pistil formed by the union of several carpels
302. Of fruits formed of a single carpellary leaf the most
important are the following; viz. The Follicle, Legume, Drupe,
Achennium, Caryopsis, & Utricle.

303. The Follicle is a carpel deliscing by the ventral sutura
of having no dorsal suture.

304. The Legume is a carpel having both a ventral &
dorsal sutura, of deliscing by both, either, or neither. When it
is articulated transversely into several pieces it is called a
loment.

305. The Drupe is indehiscent, if its pericarp present
a distinct separation of epidermis, mesocarp & endocarp.

306. The Achennium is an indehiscent, bony, one-seeded
pericarp, which does not adhere to the integument of the seed.

307. Sometimes it bears the remains of a calyx at its summit;
or it is drawn out into a beak; or is lengthened into a tail, etc.
In the Cashew-nut it is elevated on a large fleshy
receptacle.

308. The Caryopsis is an indehiscent, membranous,
one-seeded pericarp, which adheres firmly to the
integument of the seed, as in all the Grass Tribe.
309. The *Utricle* is a capsule, the pericarp of which has no adhesion with the integument of the seed.

310. Of fruit formed of several carpels, the principal are: the *Capsule*, **Pyxis**, *Samara*, *Cremocarp*, *Niculanum*, *Silique*, *Nut or Gland*, *Berry*, *Orange*, *Pome*, *Pepo*, *Balaustea*.

311. The **Capsule** is a several-celled, dry, dehiscent pericarp.

312. The **Pyxis** is a capsule that opens transversely (298).

313. The *Samara* is a leathery or membranous fruit, of one or more cells, much compressed, if prolonged laterally in wings.

314. The *Cremocarp* is composed of a pair of cheeks, placed face to face, by separating from a central axis; as in all umbellifers.

315. The **Silique** consists of two carpels fastened together, the 

316. When the Silique is very short, it is called a Silicula.

317. The *Nut or Gland* is a dry, bony, indehiscent one-celled fruit, proceeding from a fruit of three cells, if enclosed in an involucre, called a **Capsule**.

318. The **Berry** is a succulent fruit, the seeds of which lose their adhesion when ripe, if lie in a loose pulp.

319. The **Orange** consists of several membranous carpels, fitted with pulpy bags, if surrounded with a thick indehiscent rind.

320. The **Pome** or **Apple** consists of several united carpels surrounded by the enlarged fleshly tube of the calyx, with which they firmly adhere.

321. The **Pepo** is a fleshly inferior fruit, either indehiscent or bursting suddenly irregularly, if consisting of about three carpels; each of which is divided into two cells by its placental term, margin being so interlaced as to reach the dorsal pith or pith, as in the Pomegranate.

322. The **Balaustea** is a many-celled fruit, with the seeds arranged in an irregular manner on the backs of the cells, if formed by many whorls of carpels, three or more, enclosed within a tough rind; as in the Pomegranate.
323. The most remarkable modifications of multiple or anthocar- 
pous fruit are, the Cone, Pine-apple, & Fig.

324. The Cone is an indurated amentum ( ), as in the Pine tribe. 
When it is much reduced in size, & its scales firmly adhere, it is 
called a Gallulus.

325. The Pine-apple is a spike of inferior flowers, which all 
grow together into a fleshy mass.

326. The Fig is the fleshy hollow, dilated apex of a peduncle, 
within which a number of flowers are arranged, each of which 
contains an achene.

327. In Dorstenia the dilated apex of the peduncle is flat at open

XVII. Seed.

328. The seed is the ovule arrived at maturity. It consists of
integuments, albumen, y embryo; y is the result of the reciprocal 
action of the Stamens & pistils.

329. In general, seeds are, like ovules, enclosed within a 
covering arising from a carpellary leaf (leaves) but Gymnosperms 
are exceptions. Moreover some ovules rupture their ovary as the 
years of these become naked seeds: as in Leontice. Others have 
their ovary only partially closed; as in Nigronella.
330. The seed proceeds from the placenta (297) to which it is attached by the funiculus, which is sometimes very long, but is more frequently not distinguishable from the placenta.

331. Sometimes the funiculus, or the placenta, expands about the seed into a fleshy body called the aril, e.g. the Reese of a nutmeg. It is never developed until after the ripening of the ovule, and must not be confounded with tumours or dilations of the integument of the seed.

332. Sometimes there are tumours of the testa near hilum, or at the opposite end; such are called Strigilis in Carunculæ.

333. The scar, which indicates the union of the seed with the placenta, is called the hilum or umbilicus.

334. The integuments are collectively called testa, and consist of membranes resulting from the sac of the ovule.

335. Sometimes the testa is covered by a hair-like expansion of its whole surface; as in the Cotton, or these hairs occupy one or both ends, when they constitute what is called the coma. This must not be confounded with papillæ (397), which is calyx.

336. The integuments are often expanded into wings, which are either single, or several, of appear intended to render the seeds buoyant. Very often they are corky or spongy, or not infrequently consist of spiral cells.

337. The membranes of the seed are called by various names, of which the most frequently used are epimedium, or testa for the primine; mesoparen for the secondary; and endopleura for the coat of the nucleus (267).

338. The mouth of the foramen (269) is often distinctly visible, and is named the micropyle.

339. The raphe is in no way connected with impregnation, its function being apparently confined to maintaining a vascular connection between the placenta and the base of the nucleus, for the purpose of nourishing the latter.

340. Where vessels of the raphe expand into the mesosphere, the chalaza appears, as a constricted thickening of the integuments.

341. The micropyle always indicates the place in a seed to which the radicle points.

342. And the chalaza is as constant an indication, when it is present, of the situation of the cotyledons.
342. Between the integuments of the embryo of many seeds lies a substance called the albumen or perisperm.

343. It consists of a peculiar matter deposited during the growth of the ovule, among the cellular tissues of the nucleus. It is soft when fresh, but when perfectly dried with the cellular tissues; of rumination, when a portion of the tissues remains uncoagulated.

344. Albumen is usually sterile, and may be frequently eaten with impunity in the most dangerous tribes.

[Diagram of seeds with axes and winged seeds]

345. The organized body that lies within the seeds, by the purpose of protection of nourishing which the seeds were created, is the embryo. This organ was originally included within the seed of the amnios ( ).

346. The latter is usually absorbed or obliterated during the advance of the embryo to maturity, but it sometimes remains surrounding the ripe embryo, in the form of vitellus, as in Pepper.

347. The embryo consists of the cotyledons, the radicle, the plumule, by the collar.

[Diagram of various stages of embryo development]

348. The preceding are all dicotyledonous embryos.

Fig. 11. Fungiform monocotyledonous embryo; 12. lower seed of a grape.
Seeds.

247. The coryledons represent undeveloped leaves.

248. The plumule or gemmule is the part that is destined to become the ascending axis.

249. The radicle is the rudiment of the descending axis.

250. The collar is the line of separation between the radicle and the cotyledons. The space between the collar of the base of the cotyledons is called the caudiculus.

251. In some seeds the embryo is furnished with a suspensor from the point of the radicle (247, p. 2).

252. When several embryos are produced within a single seed, it sometimes happens that two of them grow together in which case a production analogous to animal dicotyledonous monsters is formed: as in the Hippeastrum.

253. The number of cotyledons varies from one to several. The most common number is either one or two. In the latter case, they are (with rare exceptions) placed directly opposite each other.

254. The direction of the embryo with respect to the seed will depend on the relation that the integuments, raphe, chalaza, hilum of micropyyle, bear to each other.

255. Plant that have but one cotyledon to the seed, or, if two, with the cotyledons alternate with one another, are called Monocotyledonous.

256. Plant that have two opposite each other, or a greater number placed in a whorl, are called Dicotyledonous.

257. Plant that have no cotyledons are said to be Acotyledonous. But this term is usually applied only to cellular plants, which, having no stamens of pistils, can produce no proper seeds.

258. Acrigenous plants () are acotyledonous.

259. The plumule is often latent until it is called into action by the germination of the seed. Sometimes it is not distinguishable from the cotyledons: at other times (as in Indian corn) it is highly developed as lies in a furrow of the cotyledon. In the monocotyledonous embryo, it frequently happens that the plumule is rolled up in the cotyledon, the margins of which...
grow together, so that the whole embryo forms one uniform mass. (347, fig. 12); but as soon as germination commences, the margins separate.

361. The radicle elongates downward, either directly from the base of the embryo, or after previously rupturing the integuments of the base.

362. When the seed is called into action, germination takes place. The juices which were before insipid, immediately afterwards abound in sugar (as in barley) of growth commences.

363. The growth in the first instance is caused by the absorption of decomposition of water, the oxygen of which combines with the superfluous carbon of the seed, Y is expelled in the form of carbonic acid gas.

364. As this phenomenon does not take place in full grown plants, except in the dark ( ), so neither can it occur in seeds, except under the same condition. Hence an embryo exposed to constant bright light, would not germinate at all; hence the care taken by nature to provide a covering to all embryos, in the form of the integuments of the seed, or of a pericarp.

365. As soon as the necessary proportion of carbon is removed from a seed by the expulsion of carbonic, the young plant begins to absorb food, Y to grow by the processes of assimilation of respiration already described.

Acrogens, or Flowerless Plants.

366. Many plants are flowerless, or destitute of organs furnished with stamens of pistils; so that they are not increased by seeds. Such are propagated by what are called organs of reproduction, which have no other analogy with the organs of fructification except that both perpetuate the species.

367. The reproductive organs of flowerless plants vary according to the tribes of that division of the vegetable kingdom; Y have so little relation to each other, that each principal tribe may be said to have its own peculiar method of propagation.

368. They all agree in their reproductive parts, or seeds, which are analogous to seeds, not germinating from any fixed point, but producing root or stem indifferently from any point of their surface. This germination is therefore vague.
Aegora or Flowerless Plants.

369. The principal tribes are Ferns, Mosses, Lichens, Algae, and Fungi.

370. Ferns are increased by little bodies called spores, enclosed within cases named theca or sporangia, which often grow together in clusters or sori, from the veins of the under sides of the leaves, or from beneath the epidermis. The latter, when it encloses the theca, is termed the indusium.

1. Portion of the frond of a fern, with sori enclosed in an indusium; b. the veins of the frond; c. theca surrounded with an annulus; d. style of the annulus.

2. Portion of a frond, exhibiting sori covered with an indusium.

3. The same; the indusium remains.

4. Branched stems of a fern, with leafy leaves, y. c. called theca.

5. Bract or spike of fructifications; the latter consisting of imbricated scales, under each of which is a theca.

371. The indusium separates from the leaf in various ways, in consequence of the growth of the theca beneath it.

372. The theca have frequently a stalk (fig. 1, d.) which arises on one side, y. finally curving with their curvature, discoi bears on the opposite side. This surrounding portion is called the annulus.

373. These theca may be considered as minute leaves, having the same gyrate mode of development as the ordinary leaves of the tribe: their stalk or style is the petiole, the annulus the midrib of the theca itself, the laminae, the edges of which are united. They would therefore be analogous to carpels, if it appeared that they were influenced by the action of any vivifying matter.

374. Mosses (in which, considered as a tribe we may include the liverworts or Hepaticae) are increased by spores contained within an urn or theca, or sporangium, placed at the summit of a stalk or seta, y. bearing at its apex a kind of loose hood, called a calyptra, y. closed by a lid or operculum.

375. The inside of the theca of true mosses has a central axis or columnella, y. the orifice beneath the operculum is closed by leaf-like
Aerogens or Flowerless Plants.

procepes, or a membrane, called the peristome.

1. Theca, nat. size. 2. Theca with calyptra. 3. Theca with single peristome. 4. Theca with apophysis (a). 5. Theca with double peristome. 6. Young theca (a) called pistillodium, with a club-shaped body (b) called a staminidium, with papillated threads, which are, probably, abortive staminidium. 7. Plant of Physconia (Phyllum). a. 4-valved theca; b. involucre; c. spores.

376. At the base of the theca is sometimes found a tumour, or a swelling, or an equal expansion named apophysis (4. a).

377. The number of the teeth of the peristome is always some multiple of four.

378. The calyptra grew originally from the base of the stalk, but when the latter lengthened, the calyptra was torn away, and carried up on the tip of the theca.

379. The calyptra may be regarded as a concrescent leaf; the peristome, another; the peristome, one or more whorls of minute flat leaves; the theca itself as the excrescent distended apex of the stalk, the cellular substance of which separates in the form of spores.

380. There are also in mosses certain organs, called anthids by some, which do not appear to be analogous to the bodies so named in flowering plants, of the nature of which has not been demonstrated. They are jointed filaments, staminidium or anthidium, containing vibris (sex-molecules) lodged in mucous cells, which surround the rudiment of the future theca (fig. b).

381. Lichens are cellular expansions, usually horizontal, but occasionally perpendicular, consisting of a thallus, or combination of stem and leaves, upon which shields, apothecia, or reproductive organs appear.

382. The shields consist of a margin, enclosing a kernel (nucleus), in which tubes containing spores, called asci, are imbedded.
Acrogens or Flowerless Plants.

Shields vary a little in their nature, some of the forms have received particular names, such as centellum (fig. 1, 2, 3); 
Trebouxia (4); clava (5); a disk-like elevation of the thallus 
is called a nodetum (4); a cup-like expansion is called a scyphus (4).

383. Algae are submerged plants, consisting entirely of 
cellular tissue, propagated by spores lodged in various parts 
of the system.

384. The spores either lie freely in the whole substance of the 
plant, or are collected in particular cells, occupying 
jointed filaments, or are placed in spherules, occupying the circumference 
of expansions of the thallus (381). There are also other modes 
of multiplication.

Fig. 1. Fucus vesiculosus. a. air bladders, b. reproductive organs. c. magnified view of f. d. e. f. g. Fig. 2. Cluster of spores. Fig. 4. Single spore 
with jointed filament.

Fig. 3. Vaucheria nana. g. spore case.
Fig. 5. Ulva nana. h. with two kinds of fruit body, i. j. spores lodged in 
the joint of the frond (a). k. l. ova, receptacle, (b).
Fig. 7. a. Converse, with green (reproductive) matter collected in glo-
bules.

385. Fungi constitute the lowest forms of vegetation. They are 
cellular, but some of the cells contain spermat threads. They are 
propagated by spores. In the highest forms, the spores of organs 
are detached: one cystidium, or conical naked elevations; the 
other basidium, which are also conical elevations, but they bear 
spores in definite number on their apex.

386. The highest forms of the fungi consist of a stipes, 
an annulus, or collar, a pileus or cap, or hymenium. 
Some have spores enclosed in acii (387). The lowest forms are 
reduced to a mere peridium or integument containing reproductive 
matter, or consist of cells placed end to end of containing spores.
II. Systematical Botany.

387. Systematical Botany is the science of arranging plants in such a manner, that their names may be ascertained, their affinities determined, their true places in a natural system fixed, their sensible properties judged of, and their whole history elucidated with accuracy and certainty. Anything short of this is not a system, but an artificial scheme.

388. The latter is intended to enable a person to ascertain the name of a plant if it goes no further. But as the name conveys no information by itself; the powers thus acquired by artificial schemes is of but little real value, and cannot be considered as anything beyond a very imperfect mode of investigation.

389. In a natural arrangement, the name of a plant is the least object that is gained. Any investigation of its principles, i.e., the discovery of the relationship of a plant to others; its plant to other plants, and its character in its sensible properties, is often enabled to judge of the use of an unknown plant whose place is determined in the system, by the ascertained qualities of those species in whose vicinity it takes its place by virtue of its natural affinities.

390. The only artificial schemes in general use are, 1, that of natural nomenclature, the characters of which are based on variations in the forms of fruits; 2, the Analytical method. The former is most correctly even used by scientific botanists.

391. The Analytical Method is founded upon the common process of analysis that is unconsciously employed by the human mind. In all cases the mental operation by which one thing is distinguished from another, consists in a continual contrast of characters. For instance, in a mass of individual objects, we distinguish one set which is colored, another which is colorless; those that are colored, we distinguish red, black, blue, or green, of the red, some are square, others are round; of the round, some are sculptured on the surface. Others are seen; if so we proceed, analyzing the subject by a constant series of contrasts, until we arrive at a point beyond which no analytic
III. The Natural System.

392. The true Natural System, whenever it shall be discovered, will represent the species, genera, orders, alliances, groups, sub-clases, if classes of plants, or whatever other divisions may be admitted into it, so arranged, that each plant shall stand next those to which it is more nearly allied in structure than to any others.

393. But the skill of man has not yet attained this and: no system answering to this description has been devised, nor does there appear any probability that it will be discovered till our knowledge of plants is much more advanced.

394. All the so-called natural systems of the present day, partly artificial and partly natural. The lower of the higher divisions in them are natural, the intermediate divisions are artificial. In other words, the stones of the edifice are heaved if squared, if the general plan is drawn out, but no builder has yet been found with skill to put them together so as to form a consistent whole.

395. But although in theory no system that can properly be called natural has yet been devised, yet for practical purposes many answer to the name, if fulfil the principal conditions required of them.

396. The generally natural orders can alone be considered as agreed upon by botanists, the other divisions are unsettled: if this is the reason why the natural orders seldom follow in the same manner in the arrangements of two different botanists.

397. There is no such thing as an arrangement which shall express the natural arrangements relations of plants in a consecutive series. It seems to be generally admitted that each species is allied to many others, in different degrees of such relationship, best expressed by rays (the affinities proceeding from a common centre, the species). In like manner, in studying the mutual relationship of the several parts of the vegetable kingdom, the same form of arrangement is constant, by means of genera and orders being found to be the centre of places, whose surface is only defined by the points where the last traces of affinity disappear.

398. But although the mind may conceive of such a distribution of organized beings, it is impossible to present it to the eye, and
Natural System.

all attempts at effecting that object have failed.

399. The fundamental principle of systematic botany is, that those plants should be stationed in company with each other which have the greatest degree of affinity; if that there should be placed most remotely which have the smallest degree of affinity.

400. Affinity is an accordance in all essential characters.

401. From this is distinguished analogy, which is a conformity in one or two characters only.

402. What we call the characters of plants are merely the signs by which we judge of affinity; if all the groups into which plants are divided are in one sense artificial, inasmuch as nature recognises no such groups. Nevertheless, consisting in all cases of species closely allied in nature, they are in another sense natural.

403. But as the classes, sub-classes, groups, alliances, natural orders & general of botanists, have no real existence in nature, it follows that they have no fixed limits; consequently that it is impossible to define them with precision.

404. If a system is ever to be devised which shall be natural in all its parts, as far as human means can make it so, this will be brought about by settling the relative value of the characters by which plants are limited, & by introducing uniformity & consistency into the distinctions of the groups, whether inferior, superior, or intermediate.

405. The following propositions seem incontrovertible:

1. Nothing that is constant can be regarded as unimportant.

2. Everything constant must be dependent upon, or connected with, some essential function. Therefore all constant characters of whatever nature, require to be taken into account in classifying plants according to their natural affinities.

405. On the other hand, whatever points of structure are variables in the same species, or in species nearly allied to each other, or in neighboring genera, are essential to the vital functions, & should be set aside, or be regarded as of comparative unimportance.

406. Those peculiarities of structure which are connected
with the manner in which a plant is developed are physiological.

407. These peculiarities of structure which are connected with the manner in which parts are arranged are structural.

408. Physiological characters are of two kinds; 1. those which are connected with the mode of growth (or organs of vegetation), y, z, those which regulate reproduction (or organs of fructification).

409. Physiological characters are of greater importance in regulating the natural classification of plants than structural.

410. All modifications of either are respectively important, in proportion to their connection with the phenomena of life.

411. The internal or anatomical structures of the axis y of the fructicle is of more importance than any other character because these are the circumstances which essentially regulate the functions of growth, y, the very existence of the individual.

412. The next in order is the internal structure of the seed, by which the species must be multiplied.

413. Next to this must be taken the structure of the organs of fructification, by whose united action the seed is called into being; for without some certain, uniform, y, invariable action on their part, the race of a plant must become extinct.

414. On the other hand, the floral envelopes ( ), the number, form, y, condition, the presence or absence, the regularity or irregularity, seem to be unconnected with functions of a high order, y, to be designed rather for the decoration of plants, or for the purpose of giving variety to the aspect of the vegetative world; they are consequently of low y, doubtful value, except for specific distinctions.

415. The consolidation of parts of fructification is a circumstance but little attended to in a general point of view, except in respect to the corolla; but it probably deserves to be regarded with great attention.

416. If consolidation, is on the one hand, to be regarded as a character of high importance, so must disunion also be so considered on the other.

417. Beyond these points, no fixed rules have been discovered for judging of the value of the subordinate peculiarities of plants, y, the estimation of secondary characters is in a great degree arbitrary.
Natural System.

IV. The Natural System of De Candolle.

Many natural systems have been proposed by different botanists. Ray, Linnaeus, Sulpce, De Candolle, Bartling, Lindley, and others have each had their own system; but perhaps the best one that can be given of them is, that while they are all far from the truth, each has some merits which the others want.

The system of De Candolle, however, having been taken as the basis of the most perfect enumeration of plants that has ever been made, we shall give the characters of his principal divisions, and arrange our list of medicinal plants according to the natural orders as he has disposed them.

Plants are either furnished with visible flowers, or they are multiplied in some other way. Hence the two great divisions of Flowering (Phanerogamous or Phanerogamica) and Flowerless (Cryptogamica).

Flowering plants are either Exogens (\(\text{Ex}\)) or Endogens (\(\text{End}\)), with which Dicotyledons (\(\text{Dic}\)) and Monocotyledons (\(\text{Mon}\)) respectively correspond.

Flowerless plants are Anthecagamous (Semi-vascular), that is furnished with stomata \(\&\) vascular tissues; or they are Ambiegamous (Cellular), that is, destitute of stomata and entirely vascular cellular.

Hence arise four Classes

1. Flowering Plants.
   - Class 1. Exogens or Dicotyledons
   - Class 2. Endogens or Monocotyledons

2. Flowerless Plants.
   - Class 3. Anthecagamous or Semi-vascular
   - Class 4. Ambiegamous or Cellular.

The principal subdivisions of these classes will be found in the following list of medicinal plants.
Medical Botany.

The following list embraces the more important plants from which materials, employed medicinally or for food, are obtained. Those that are natives of North America are underlined. Thus, Baptisia tinctoria. If the plant is merely naturalized in North America, the mark § is added: thus Conium maculatum §.

The names of the most valuable plants are written in larger letters than usual; thus Papaver somniferum; while those of doubtful or feeble powers are indicated by this mark ( ) e.g. Scutellaria lateriflora.

The following abbreviations are used for countries; viz.: E. for Europe; Af. Africa; As. Asia; E.I. East Indies; W.I. West Indies; S.E. South America; N.H. New Holland; C.G.H. Cape of Good Hope.

The generic names have numbers prefixed to them if they are underlined with a double line: the English generic name (when there is any) follows immediately after.

Class I. Exogena. ( )

Subclass I. Thalami-Flora.

Flowers furnished with a calyx of cordar. Petals distinct. Stamens hypogynous ( ).

Order Ranunculaceae. The Crow-foot Tribe.

1. Ranunculus (Crowfoot). Nearly all the species of this extensive group possess powerful, acrid, rubefacient and vesicatory properties. The principal species are R. bulbosus, R. sceleratus, R. acris, R. Flammula, regens, and botulinus. The juice of R. toes is used for poison weapons.


4. Hydrastis canadensis (Yellow-root). Rhizome yellow; a tonic bitter.

5. Anemone (wind flower) nemorosa Pulatilles. Ew. Extract used in tumors, hollans, Ew. coronaria Ew. y nemorosa Ew. are all highly acrid.

6. Hepatica (Liverwort) tribulus. Ew. § used as a remedy for hemorrhage.

7. Clermatis (Virgo's bow) cretica. Ew. Rhamnula, Ew. Vitalbina Ew. are acrid & vesicant. C. Virginiana is a plant of decumbent.
8. Helleborus (Hellebore) rigor. Eu.; viridis, Eu.; foetidae, Eu.: all narcotic and astringent. Used as a purgative and as a cathartic.

9. Coptis trifolia. Its rhizome is a tonic bitter without astringency.


11. Delphinium (Larkspur) consolida, Eu. Acrid; seeds emetic.

12. Aconites (Aconitum) hypocraterum. Anthers of paniculations are narcotic and acrid, particularly the roots. All nations of Europe.

A. napellus, Eu. More powerful than the preceding. The tincture of its leaves is useful in rheumatic and neuralgic affections. It blunts the sense of pain.


A. alba (White Cohosh) & A. rubra (Red Cohosh). The roots are mild astringents of tonics.

14. Cinchona (Bugbane) racemosa (Black snakeroot). Root tonic and astringent; also diaphoretic and expectorant.

15. Xanthothisis aphyllia (Yellowroot). Root, wood of bark intensely bitter, of tonic.


Order Annonaceae. The Custard Apple Tribe.

17. Euterpe longifolia. S.A. Fruit a valuable febrifuge.


Order Menispermaceae. The Moonseed Tribe.


22. Annona. Cocules, S.A. The seeds are cocules Indians of Commerce; a well known poisonous drug.


Other genera of species of this order are more or less bitter of tonic.
Order Berberidaceae. The Barberry Tribe.
25. Berberis vulgaris & var. (Common Barberry) Fruit acid; bark astringent
26. Lonicera thalictroides (Blue Cohosh, Popoosroot). Bitter diuretic
The seeds when roasted are a pretty good substitute for coffee
27. Jepsonia diphylla (Swamp Apple) Stimulant, diuretic, antiseptic.

Order Nymphaeaceae. The Water Lily Tribe.
The large rootstocks of this order are astringent, of slightly narcotic
The N. American genera of species are chiefly the following: viz
29. Nuphar latifolia, advena & sagittatolia. (Yellow Pond-lily)

Order Nelumbiaceae. The Lotus Tribe.

Order Dilleniaceae.
Plants of this order are generally astringent: none are yet official.

Order Magnoliaceae. The Magnolia Tribe.
32. Magnolia glauca (Swamp Magnolia). Bark bitter and aromatic.
M. acuminata. leaves, stimulant, tonic & aromatic.
33. Liriodendron tulipifera (Tulip Tree) Bark stimulating tonic.

Order Winteraceae. The Winter's Bark Tribe.
34. Ilexicum floridanum. Seeds aromatic stimulant.

Order Cruciferae. The Cabbage Tribe.
A very large order. All the species are herbaceous; most of them are
ever or else pungent and antiseptic. The pungency is volatile.
36. Cochlearia officinalis (Shore-grape) Eu.
C. Armoracia. Eu. (Horse-radish)
38. Sinapis nigra & Eu. (Black mustard) Seeds acrid, stimulating & bitter.
Oil pungent.; rubefacient.; vesicant.
40. Raphanus sativus & Eu. (Radish) Seeds emetic; root diuretic.

Order Capparidaceae. The Caper Tribe.
41. Capsicum annuum Eu. The young flower buds are the capers of the shops.
Order Papaveraceae. The Poppy Tribe.
42. Papaver somniferum. Eu. (medicinal poppy) The raw juice of the halfripe capsules, is opium. The oil of the seeds is bland and inactive.

Order Cistaceae. The Rock-rose Tribe.
44. Cistus creticus. Eu. Produces the gum-resin Cistusaceum; a stimulant, of common

Order Violaceae. The Violet Tribe.
The roots of most are emetic.
45. Ionidium Specacanthus of Brazil, produce roots that are often substituted for true Specacanthus. Other species are powerful emetics of purgative.

Order Polygalaceae. The Milk-wort Tribe.
46. Polygala senega. (sense brake-root) Root stimulating a depositment of phlegm.

Order Malvaceae. The Mallow Tribe.
47. Althaea officinalis. Eu. (Marsh mallow) mucilaginous of emollient. Similar properties exist in most of that tribe.
48. Glycyrrhiza herbacea. Eus. & As. The root of the seeds is cotton.

Order Tiliaceae. The Linden Tribe.
49. Tilia americana. (Linden or Bass-wood). The bark emollient of mucilage.

Order Dipsacaceae.

Order Aurantiacae. The Orange Tribe.
The juice of the fruit usually abounds in citric acid, of sometimes in sugar. Citrus aurantium yields the bitter orange; C. Bitteria the Seville orange; C. Limetta is the bergamot; C. Limonius yields the Lemon.

Order Hypericaceae. The St-Johnswort Tribe.
52. Hypericum perforatum & Eu. (Common St-Johnswort). Leaves astringent.

Order Cuttiferae.
53. Hebraedendron Camboginoides. (Ceylon yields Gambooge. (See Graham's Chris.
tion, in Compl. to B.A. Mag. 2. P. 193 & 233)
54. Coffeifolium. Cafaba. S.S. Yields the resinous juice Tocamahaca.
The general properties of the order are acid of purgative.
Order **Aceraceae.** The Maple Tribe.
35. *Acer saccharinum* (sugar maple) of *A. negundo* (black maple) yields maple sugar. The bark of *A. rubrum* is a good astringent.

Order **Fernstroemiaceae.** The Tea Tribe.
(The genus has been placed after Rosaceae)

Order **Cedrelaceae.** The Mahogany Tribe.
37. *Swietenia Mahagoni*, wood (mahogany). The bark is a tonic.
38. *Lophostemon falicifolius* (S. I. Bakes) tonic and astringent.

Order **Meliaceae.** The Bride of India Tribe.

Order **Vitaceae.** The Vine Tribe.
42. *Vitis vinifera* (Grapeseed) As fruit coating of antiscorbutic; diuretic & laxative in large quantities. Aniseins more laxative than the fresh fruit. The male species produces wine, but not raisins.

Order **Geraniaceae.** The Geranium Tribe.
44. *Geranium maculatum*. Root a powerful astringent.

Order **Balsaminaceae.** The Balsam Tribe.
45. *Impatiens pallida* & *pilosa*. Emetic, cathartic & diuretic.

Order **Linaceae.** The Flax Tribe.

Order **Oxalidaceae.** The Wood sorrel Tribe.
47. *Oxalis*—a numerous genus—all acid, containing oxalates of *potash*.

Order **Rutaceae.** The Rue Tribe.
Most of the species contain powerfully scented oils.
48. *Ruta graveolens* (Common Rue) In., anthelmintic, sedative of insomnia.
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Order Xanthoxylaceae.
71. Xanthoxylum Clausa Hercule, M.D. Bark sudorific of expectorant.
72. Americanus & Caroinianus (both called prickly ash). Sinu-
ent, diaphoretic of subaromatic. Used in chronic rheumatism.
Other species of similar powers, grow in Asia.
73. Ptelea trifoliata (Scrubby breshell) Fruit a substitute for hops.
73. Roncea antidysenterica, Physozoon. Bark tonic & astringent.

Order Zygophyllacese.
74. Guaiacum officinale, M.D. (Lignum vitae) Yields a thin gum-resin.

Order Simarulaceae. The Quassia Tribe.
75. Quassia amara, E.D. Wood an intense purine bitter.
76. Simarubas amara, M.D. Bark of the root a powerful bitter.
77. Pieraema excelsa, M.D. The wood yields most of the Quassia chips.

Subelaps II. Calyciflore.

Flowers furnished with a calyx of corolla. Petals distinct.
Samaras perigynous ( ).

Order Coelastraceae.

Order Rhannaceae. The Buck-thorn Tribe.
79. Thamnus catharticus & eu (Common Buckthorn) Frangula In.
The berries active cathartic.
80. Tizyphus Aemphav E.D. Fruit acid.
Z. Juyba, y vulgariz, E.D. The fruit is jujube.

Order Ancaradiaceae. The Cashew Tribe.
82. Anacardium (Samac) Toxicodeon, var. vomerifera, Indian of venenato-
ence acid poisonous to many persons. The berries of R. glabrum & E.D.
Flavors yields imbalates of lemon, an acrid acid.
83. Pistacia vera, E.D. Fruit emollient. Produces Pistacia nuts.
P. Perrobdenus, E.D. Yields Cypress turpentine.
P. Lenticus, E.D. Yields the resin called Mastic.
84. Anacardium occidentalis, E.D. M.I. The fruit is the Cashew nut.
The coat of which contains a caustic oil. The fleshy peduncle is edible.
Order Leguminosae. The Bean Tribe.

85. Baptisia tinctoria, Catalpa, emetic of subastringent. Injurious when mixed with the bath of the root useful in some forms of jaundice.
87. Indigofera (Indigo) The common indigo is produced by I. tinctoria. The blue dye of this plant is a dangerous poison.
88. Glycyrrhiza glabra, Euc. (Liquorice) Roots sweet, tonic, demulcent. The root extract is common liquors.
89. Punicaria Erythrina, M.1. (Jamaica Dogwood) Bark narcotic of diaphoretic.
90. Cichoreus boerenho, Euc. (Bladder Seneca) Leaves strong, used for dullening.

Stinging Nettle.

91. Astragalus versicolor. Roots yield most of the Fragacantha of commerce.
92. Fragacantha. De Candolle says produces no Fragacantha.
93. Alhagi Maurorum, Egypt. 6. (Camele Thorn) Produces a kind of manna.
95. Abrus precatorius (Wild Liquorice) Euc. 6. 4. 9. M.1. Infusion of a extract of the root of leaves used instead of liquorice.
96. Muscaea punctata, M.1. (Cowitch) The medicinal, attacks consist of the strong, stinging hairs of the flower.
97. Muscaea punctata, Euc. 6. 3. Resembles the preceding.
98. Petrosia erinacea, 6. 4. Produces kino, a powerful astringent.
99. Mucuna, Euc. 6. 3. Also produces a good resin like kino.
100. Draco, M.1. The dried resinous juice formerly called Dragoin Blood.

Senna.

102. Caesia, Lopet, India. Produces the finest (Timneville) Senna.
103. Acetifolium, Egypt. Produces Alexandrian Senna.
104. Lancedota, Arabia. True Senna of Arabia.
105. Obovata, 6. 4. Produces Black-lanced Senna, an inferior kind.
107. Catharticaea, Tristula, Euc. 6. 7. Produces Cassia pods, the pulp between the seeds of which is a gentle laxative.
110. Hymenoda, M.1 8. 1. A. The resin (a kind of flage) tonic and exciting.
111. Punicaria tuber, barks anthelmintic.

Order Saxifragaceae. The Saxifrage Tribe.

114. Heuchera Americana (Plum-root) A powerful astringent.
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Order Rosaceae. The Rose Tribe.

108. Genus (Quercus) includes, in, Stomachic Medicine in Diseases,  


110. Rubus. Viscusus. (Blackberry) Bark of the root a valuable astringent.  

111. Rose (Rose) Centifolia, Caucasus. Petals used for making Rose water.  

112. R. Canina (Dog Rose) S.A. Petals of the tree used for making rose  

113. R. gallica, (S.A. Petals aromatic of tonic.

114. Gillenia trifoliata. (Ivy) Stipulaceae. Both are called American-Ipecac.  

115. Spinae, a mild but efficient emetic, and occasionally purgative.

116. Spinae, the species nearly all bitter, astringent, and tonic.

117. Anguinae, communis, Redberry, Syra, etc. Produces Sweety Bitter almonds.  

118. B. Persica. (Plack) The flowers of kermes contain propionic acid.


120. G. Carolinae, properties similar to the preceding.

121. Sorbus (Wild Cherry) Bark and prey tonic of febrifuge.

122. Pyrus. (Mountain Apple) Flowers, and root poisonous.


Order Urticaceae.

125. Myrtus communis. S.A. Yields Balsam of Peru.


127. Copaifera. Balsam of Copaifera is produced by different (S.A.) species of this genus.

Order Myrtaceae. The Myrtle Tribe.


129. Primula. (Pomegranate) Bark of the root a powerful anthelmintic. Flowers of vine of the fruit, tonic of astringent.


131. Caryophyllus aromatica, Melicaceae. The dried flower buds, or Cloves, are stimulant and carminative: these yield oil clove.

132. Eugenia. Pimenta, S.A. The unripe fruit is Allspice, oily and stimulating.

133. Eucalyptus. resinifera. S.A. Bark astringent yielding a sort of kino.

Order Cucurbitaceae. The Gourd Tribe.

134. Lagenaria vulgaris (Bottle Gourd) Fruit poisonous.
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125. Lucumis Coleythis. The unripe fruit yields Coleythol.
126. Luffa amara. E. J. Fruit violently cathartic & emetic.
127. Bryonia dioica, ex. (Bryony) Root active of purgation.
128. Momordica Elaterium. The fruit yields Elaterium.
129. Melaria pendula, E. J. Extremely drastic.

Order Cactaceae. The Indian Fig Tribe.
130. The fruit of several species is eaten under the name of Indian Fig.

131. Tribes rubrum, produces Red Currant.
R. Grossularia is the Gooseberry bush. Native of Europe.
R. nigra, is the Black Currant.

Order Hamamelidaceae. The Witch Huckle Tribe.

Order Araliaceae. The Ginseng Tribe.
R. radicans (Wild Sarsaparilla) Gentle stimulant & alterative.
134. Panax quinquefolium (Ginseng) A very mild medicinal stimulant.

Order Cornaceae. The Dogwood Tribe.
C. sericea (Swamp Dogwood) An excellent tonic, useful in intermittent.
R. cercina, astringent & C. Molinae - tonic of astringent.

Order Umbelliferae. The Umbelliferous Tribe.
C. vorax, ex. (Water Carbone) A virulent poison effect like that of
fixie acid.
137. Aegopinus gramineus, ex. (Celery) Poisonous of acid when Wilk. in
wet ground, a pleasant salad when cultivated in dry ground.
Petroselium sativum, ex. (Parsley) Stimulating salad
138. Carum Carvi, ex. (Caraway) Carminative
139. Anethum foetidum. ex. (Dead Tongue) A dangerous poison
A. Phelemodanium, ex. (Water Dropwort) Less poisonous than the preceding.
140. Asafoetida, ex. (Ferret, parsley) The leaves a narcotic poison.
141. Foeniculum vulgare, ex. (Common Fennel) The fruit yields Oil of Wild Fennel.
F. dulce, ex. (Sweet Fennel) Yields Oil of Sweet Fennel.
Medical Botany.

142. Archangelica altissima. (Common Angelica) Pleasant aromatic tonic.

143. Aegopodium podagraria. (Prairie Angelica) Root fragrant, pungent or somewhat bitter.

144. Achyranthes aspera. (Indian Wake-Root) Root acrid, a heart tonic.

145. Ferula Asafoetida. Fiss. S.I. The pithy gum resin of asafoetida is obtained from the roots.

Fennel, &c. Sufifides) gives the gum resin, syphonum, but Prof. B. Dow says it is produced by Pteronia ammoniacum of Jedediah. See Linnaeus, vol. viii. 401.

146. Peganum harmala. (Judas plant) Juice of the root antiseptic, of diuretic.

147. Imperatoria. (Baccharis) juice of the root antiseptic, of diuretic.

148. Anthosma graveolens. (Dill) Juice of the root antiseptic, of diuretic.

149. Heracleum. (Eupatorium) Syphonium, &c. Y exhilarating. Like the preceding.

150. Peganum harmala. Syphonium, &c. Yields the gum resin, Peganum. See Dow, &c.

151. Coriandrum. (Caraway) Coriandrum, &c. (Common Caraway) Fruit carminative of diuretic; not used for poultices.

152. Anthriscus caraolus. (Chervil) Root, catable.

153. Coriandrum. (Hemp, or Poison Hemp) Narcotic acid; a violent poison. The common species is C. macrocarpon subsp.

154. Coriandrum. (Shepherd's Purse) Narcotic acid; a violent poison. The common species is C. macrocarpon subsp.

155. Coriandrum. (Shepherd's Purse) Narcotic acid; a violent poison. The common species is C. macrocarpon subsp.

156. Coriandrum. (Shepherd's Purse) Narcotic acid; a violent poison. The common species is C. macrocarpon subsp.

Subclass III. Corolliflorae. (with calyx corolla. Petals united, bearing the stamens).

Order Capparidaceae. The Balsam Tree.

157. Friesea perfoliata. (Balsam Root) Bark of the root antiseptic, of cathartic.

158. Sambucus. (Elder) Syphonium, &c. (Common European Elder) Root, cathartic.

S. nigra. Syphonium, &c. Yields the gum resin, S. nigra. Bark of the root, antiseptic, of cathartic. Known by the name of Elder Berries.

S. Canadensis. Resembles S. nigra.

Order Cuscinaceae or Rubiaceae.

159. Cinchona. Many species of this genus (commonly called the Peruvian bark tree) grow in Peru. The genus of other parts of S. America, but some of them are, as yet, only known by their commercial names. The following is Lindley's classification of the principal kinds known in Great Britain.

- C. condensin
- C. microcarpa
- C. lanceolata, chiefly also C. rosaeflora
- C. cordifolia
- C. magnifica

Red Bark (Red cinchona bark or Lima) (not ascertainable)
Brown Bark (Huamalied bark) (not ascertainable)
Medical Botany

165. Exostema caribeanum. M.J. Florida (Sea-side Beach) Bark fibrous. Fruit
This is the species of the genus are bitter of tonic, but contain no Anal. poison.

166. Pinus nigrae (Georgia Beach) Bark fibrosus. -


168. Chilococcus (chestnut) (Brazil) (Cahina). A powerful emetic


171. Psychotria emetica. S.A. The root is the striated or black. Specia.

172. Eupatorium perfoliatum (Boneless) A valuable tonic stimulant.

173. Tilia cordata (Butter, India-root) Stem, diaphoretic & emetic.
174. Scirpus, squaroxy other species are also employed as diaphores.
175. Some of them are popular remedies against the bite of rattlesnake.

2. Decoction of a durable odor of Vanilla.

3. Eupatorium perfoliatum (Boneless) A valuable tonic stimulant.


5. Tuilantea (V. Costera) Highly tonic bitter.


7. E. Camassiae (Horsewood) A bitter tonic.

8. Solanum (Golden Rod) odor, a fragrant stimulant of dia-

9. Phoric oil, which resembles both anise and saffron. The leaves used as a substitute fortes.


16. Artemisia (German) (Wormwood) Most of the species of this


20. Dracunculus, Rufia (Russagor) Leaves pungent of stimulating, used as a pickel, to flavor vinegar.


22. Calendula officinalis. S.C. (Pot marigold) Antihelmintic also used as a substitute for saffron.
Medical Botany.

184. Lappa (Burdock) minor & Eu Root tonic, aperient, sudorific of diuretic.
188. S. tativus (Eu. Common Lettuce) Produces Lactacarium.
190. Taraxacum Eu. (Dandelion) Toxic, diuretic, aperient. Also used as a substitute for coffee.

Order Lobeliaceae. The Lobelia Tribe.
190. Lobelia inflata (Indian Tobacco. "Low lobelia") The sheet-anchor of the steam doctor; emetic, sudorific of expectorant.
191. L. siphilitica ("High lobelia") Emetic, cathartic of diuretic.
192.吸烟 (Wild Tobacco) Virulent, produces fatal hydrophobia.

Order Vaccinaceae. The Whortleberry Tribe.
193. Vaccinium (Whortleberry) The fruit of nearly all the species is sweet of wholesome, y somewhat diuretic. The bark is astringent.

Order Ericaceae. The Heath Tribe.
194. Rhododendron maximum (Big laurel. Rose Berry) Astringent of stimulant.
196. Nyctanthes arborea (Dwarf or Sheep laurate) Like the preceding.
197. Azalea pontica (Western Asia). The flowers poison honey.
198. Ledum latifolium (or leaves narcotic.
199. Gaultheria (incorrectly Gaultheria) procumbens (Shady Winter green) Stimulating, aromatic, diuretic of esenmenagogue.
200. Pieris floribunda (or Asarabas) Eura. Ursi (Bear Berry) Astringent of diuret.

Sub Order Pyrolaceae. The Winter-green Tribe.
201. Chimaphila umbellata (Pipsqueak) Aromatic & diuretic.

Order Ebenaceae. The Ebony Tribe.
203. Diaphyora Virginiana (Parish Mar) Bark astringent & febrifugal. Immature fruit especially astringent.

Order Styraceae. The Storax Tribe.
204. Styrax officinalis (Western Asia) Yields the balsamic resin Storax.
Order Aquifoliaceae. The Holly Tribe.

203. Ilex (Holly) Aquifolium (European Holly) Bark tonic.

204. Ilex (American Holly) virtue probably similar to the preceding.

Order Sapotaceae

205. Chrysophyllum oliviforme, S. D. Oil of the fruit used to cure itch, as well as to burn in lamps; infusion of the leaves, bark, and green fruit used for decoction.

206. Schinus Terebinthifolius (Terebinthifolia Pison) Bark a powerful astringent.

Order Oleaceae. The Olive Tribe.

207. Olea Europaea L. (Olive) The fruit yields a mild demulcent oil called olive oil. The bark is bitter of astringent.


Order Apocynaceae. The Dogbane Tribe.

209. Barbarea Manghas, S. D. Kernels emetic of poisonous; milky juice purgative.

210. Trichosanthes Nux Vomica, S. D. The seeds of this and other species are highly poisonous, known by the name of Nux Vomica. Bark bitter of tonic—usually called False Arbutus.

211. Cynanchum, S. D. The root is called Lignum Cynanchum, celebrated in India for curing the bite of venomous snakes.

212. Phytolacca, S. D. (Clearingnut) The ripe seeds used to make turpentine clear.

213. Ignatia, S. D. Philippine Jade. Poisonous; but used as a remedy for cholera.

214. Willughbeibia, S. D. The milky juice yields a poor caoutchouc.


216. Apocynum (Dogbane) and Drosanthemum. Root bitter, emetic if used.
Medical Botany.

216. Wrightia antidysenterica, S. & L. (Convolvul.) Bark astrigent, a febrifuge.
217. Plumeria rubra, M. D. Milk exceedingly corrosive.
Other species of Plumeria are useful cathartics.

Order Asclepiadaceae. The Milkweed tribe.

218. Asclepias tuberosa (Butterfly weed, Tenacious root). Root diaphoretic, etc., a restorative; also a mild tonic of stimulant.
220. Tribophorasia amphitheca, S. & L. Root used instead of opium in India.
221. Hyoscymus (Dogs' head) Angel, Egypt. Leaves, purgative, often largely mixed with Alexandrian Senna, to which its frequent grating or other unpleasant effects are attributed.
222. Hemidesmus. Indicus, S. & L. Sarcaparilla of India, yields, chiefly the root of this species.


Most of the species of Gentian are bitter, several of them are substituted for G. lutea.
225. Agastache Chiragla, S. & L. Gentian of India, a very tonic bitter.
226. Fragaria Carolinensis (American Calumba) Root a pure bitter.
228. Menyanthes trifoliata, Eu. (Buck-bean) A valuable bitter tonic.

Order Convolvulaceae. The Bindweed Tribe.

230. Convolvulus (Bindweed) Scammony, Levant & Greece. The cathartic resin called Scammony is obtained from the root.
231. C. pandurinus (Man of the earth) Root-cathartic.
232. Saponaria macrocephala. Root evacuates of purinaceous - not purgatives, as was once supposed.
233. Purga, Mexico. The root is the true Salaf.
234. Orizabensis, Mexico. The root is a kind of Salaf.
235. Catalpa, St. Domingo. Root purgative, but apt to cause dyspepsia.
236. Calystegia Sepium, Eu. Root purgative, milder than Scammony.
Order Solanaceae. The Potatoe Tribe.

233. Hyoscymus (Henbane) niger (Common Henbane)  Narcotic, antidyspeptic.
234. Atropa Belladonna, Ex. ( Deadly Nightshade) Powerful narcotic.
  Ex. fruit-seeds & (Goat-pepper) & C. bacatum (Bird-pepper) have
  similar properties, but are more acrimonious
236. Datura Stramonium, Ex. (Thornapple, Stinkweed) Violent narcotic
  poison. Useful anodyne & sedative.
  var. Tabula (?) Ex. Properties same as the preceding.
237. Physalis (Winter cherry) franchetii. Ex. & Ex. Reputed to be narcotic,
  diuretic of aperientic.
  All the species of Physalis seem to be diuretic
238. Solanum nigra (Common Nightshade) Narcotic
  Ex. Dulcamara & Ex. A poisonous narcotic—particularly the
  berries. It is usually called Billowseem.
  Ex. esculentum, L. (Aubergine) Fruit-Deble
  Ex. Lycopersicum (L. A.) (Tomato) Fruit gently laxative—said
  also to produce Physalis.
239. Nicotiana (Tobacco) Tabacum Central America (Common
  Tobacco) A powerful stimulant narcotic, y emphine. Valuable or
  cuminally as a medicine, but delirious, of disgust when em¬
  ployed in any other way.
  Ex. rustica, Ex. milder than the preceding. Syrian & Turkish To-
  bacco are prepared from this species
240. Creoscentis Quijote, M. (Calabash Tree) fruit-pectoral.

Order Scrophulariaceae. The Figwort Tribe.

241. Digitaria (Pea-glave) Purpurea, Ex. (Common Foxtail)
  Diuretic & narcotic
242. Scrophularia (Figwort) nodosa, Ex. Leaves pouy. & emet.
  Ex. aquatica, L. (Water Foxtail) Resembles the preceding
243. Linaria vulgaris, Ex. (Toad flax) Cathartic of diuretic
244. Geranium officinale, Ex. (Hedge geranium) Better pouy. & emetic.
245. Verbascum (Medicine) Thapsus & Ex. (Common Mullein) demulcent.

Order Labiatae. The Mint-Tribe.

A great number of those abound in volatile of aromatic oil, many
of which have been employed in medicine as aromatics of stimulants.
Only the more important are here noticed.
246. Lavandula (Lavender) Vera, Ex. (Common Lavender)
  yields a fragrant oil, which is an ingredient of Spirit of Lavande.
  Ex. De Cologne & Vinaigre aux quatre volcans.
Lavandula, Soches, Euc. as used by the Arabs as an expellant of phlegm.

L. Spica. ex (French Lavender) yields oil of spike, used medicinally.

247. Mentha (Pant) viridis & Euc. (Spearmint) aromatic & carminative.

M. piperita & Euc. (Peppermint) pleasant aromatic stimulant.

M. pulegium ( Pennyroyal) sm. of reputed ammonaphoge.

248. Lycopus (Water Horsemint) expectorant, as astringent, of use a popular remedy like the root for hemorrhage.

L. virginiensis (Boug weed) mild narcotic as astringent.

249. Salvia (Sage) officinalis & Euc. (Garden Sage) aromatic bitter.

250. Helichrysum officinalis (Rosemary) ex. used to promote the growth of hair; for preparing Hungary water, Foe de Cologne, Euc.

251. Amaranth Dictamnus, Candia, (Bitter of Crete) aromatic of tonic.

252. Origanum vulgare & Euc. (Wild Marjoram) wild Oil of Thyme.

253. Thymus vulgaris, Euc. (Thyme) y arrowroot, Euc. (Garden Thyme) are fragrant of stimulating.

252. Hyposper officinalis, Euc. (Hyssop) stimulating stomach.

253. Cuminum marianum (Botany) stimulating diaphoretic.

254. Hedera helix officinalis (Pennyroyal) aromatic of catarrh.

255. Melissa officinalis & Euc. (Common Balm) aromatic of bitter.

256. Scirpsus latifolius (Scirpsus) ex. used to cure hydrophobia +

257. Papata Cataria & Euc. (Catnip) wild Oil of diaphoretic.

2. Gleditsia & Euc. (Ground Ivy) tonic, diaphoretic.

258. Leonurus Cardiaca & Euc. (Mother-wort) used to emmenagogue.

259. Perchys Botanical, Euc. (Botany) used as an ingredient of cephalic muf. in fims rigid hairs causing sneezing.

260. Marrubium vulgare & Euc. (Horehound) yield tonic of stimulant.

261. Pyracanthus. Many species of this genus are indigenous to United States. They are all aromatic stimulants.


263. Monarda punctata (Horsemint) yields a stimulating oil.

264. Lysimachia (Oswego Tea) aromatic stimulant of diaphoretic.

Order Primulaceae. The Primrose Tribe.

266. Anagallis (Pimpernel) arvensis & Euc. (Scarlet Pimpernel)

Astringent & acid - once used as a remedy for cancer +

267. Cyclamen (Sowbread) hederaefolium, Euc. Root very acid.
Medical Botany.

Order Plantaginæae. The Plantain Tribe.
263. Plantago (Plantain) major & c. (Common plantain). Seeds, mucilaginous of demulcent; leaves sometimes used for dressing blisters.

Subclass IV. Monochlamydeæ.
Flowers furnished with calyx only; or without floral envelopes.

Order Phytolaccæae. The Pokeweed Tribe.
269. Phytolacca americana (Pokeweed). Violently emetic, of cathartic used for the radical cure of hemorrhoids. (See King, in Dungwells Journal.)

Order Chenopodiææ. The Goosefoot Tribe.
270. Chenopodium anthelminticum. Yields oil of wormseed, a powerful anthelminthic.

Order Nigtaequaeæ. The marvel of Peru Tribe.
272. Mirabilis Jalapa (Four o'clock). The root of this of other species are purgative.

Order Lauraceææ. The Cinnamon Tribe.

Order Polygonaceææ. The Knot-grass Tribe.
279. Rumex (Dock) crispus & c. (The astringent root used for itchi.)

R. obtusifolius & c. (Root like the preceding.

R. Acetosa (Common Sorrel); R. Acetosa, S. c. (Sorrel-root)
& S. acutus, are acid. & employed as refrigerants & diuretics.

R. alpinus, S. c. (Meads Rhubarb) Root purgative.
Medical Botany

280. Rheum (Rhubarb) This is a genus of many species, most of which are natives of Siberia, Tartary, and the northern mountains of Asia. Several of them produce the official Rhubarb, but which, it is difficult to determine with certainty. The principal region that affords it is the heart of Tibet. 

P. Emodi, E.D. produces a valuable kind of Rhubarb, but it is more astrigent than the ordinary kind. 

P. rhaponticum, European Rhubarb, Siberia &c. Root aromatic, better astrigent. 

P. undulatum, China &c. Produces a species kind of Rhubarb. 

P. compactum, Tartary, China. Root not valuable. 

P. palmatum, China, Tibet. This is generally regarded as the source of true official Rhubarb, but Lindley thinks the matter is doubtful. 

P. crassifolium, a species lately introduced into England, probably from Siberia, strongly resembling genuine Rhubarb.

281. Rumex (Dock) Crispus L. (Common curled Dock) Root - astrigent - used to cure Ulcera.


P. bistorta, Eu. (Bistort) A powerful astrigent. 

P. sagittaria, Eu. (Dock Sheet) A valuable article of Diet.

P. amphibia, Eu. Roots used as a substitute for Sarsaparilla.

Order Myristicaceae. The Nutmeg Tribe.

283. Myristica moschata, E.D. The fruit yields both nutmegs & mace.

Order Thymelaeaceae. The Mezereum Tribe.

284. Daphne mezereum, Eu. The bark is used as a rectificatory of mastic. 

D. laureola, Eu. (Pyrenean Laurel) Whole plant very acid. 


286. Borca palustris (Leather Wood) Bark and of emetic, for nausea.

Order Santalaceae. The Sandalwood Tribe.

287. Santalum paniculatum, Sandwich Isl. 

S. myristicifolium, India. This of the preceding yields the Sandalwood of commerce.

Order Aristolochiaceae. The Birthwort Tribe.

288. Aristolochia (Birthwort) A numerous genus. Most of the species have roots of a strong, bitter, aromatic taste. Several are used in their native Countries as emmenagogues, as averticines, as antidotes for the bites of poisonous animals.
Medical Botany

Sparrentia, (Virginiann Indica root) Stimulant, tonic of antipness.

A. Elatrum, European. (Boo sburg ement, a diuretic.

A. Canada, (Cold foot Wild ginger) Aromatic, tonic, stim. 3 diuretics.

Order Euphorbiacae. The Spurge Tribe.

Croton Casarilla, W. J. Said by some to produce Casarilla Bath, but with doubt, I think the bath is produced by the same species.

Eleuteria, W. J. Linely, you of other think that produce the true Casarilla.

Pseudo-quinine, Mexico, Bath, a valuable medicine like Casarilla.

Tigern, i.e. Produces the pacific, a preparations, known as Casparian Oil.

Many other species of Croton are medicinal; but not yet official.

Ricinus communis, I. J. The seeds yield the well-known castor oil.

Sapotex, Burtly, F. J. (Physic nut) Seeds violently emetic.

Jamaica, Maniok, Brazil. The prepared seeds of the root is called Casparian of Tofico.

Hevea, Guianensis, Guyana. Produces, Castor oil.

Mancinella, W. J. (Mannichea) Bailer, an acid poison.

Hueva, Croton, W. J. (Sand-box) Milky, juice, venomous; seeds drastic.

Euphorbia. The drug Euphorbias is produced by several African species of the genus.

Ipecacuanha. Root, a cathartic, emetic: in small doses, delirium.

Corallata. Cathartic, emetic, resembles Ipecacuanha.

Hypericis, (Wild pumbar) Astringent, alterative common.

Order Picrocaceae. The Pepper Tribe.

Piper nigrum, I. J. (Black pepper) Fruit, very pungent.

P. longum, I. J. (Long pepper) Fruit, very pungent.

P. Bicd, I. J. Leaves stimulating narcotic, produce intoxication.

P. Cubeba, Java. The ripe fruit is called Cubeb.

P. Cammo, Java. Also produces Cubeb.

Order Amentaceae.

Suborder Salicinaceae. The Willows Tribe.

Salix (Willow): The bark of most (all) of the species of this numerous genus, contains a principle called Salicin, which is sometimes used as a substitute for Quinine. The most important medicinal kinds are 5. Alpina, 5. Pentandra. The American species have scarcely been examined as their medicinal properties.

Populus (Poplar) nigra, I. J. (Black poplar). The young buds are aromatic, are sometimes made into an ointment for wounds.


Medical Botany.

Order Urticaceae. The Nettle Tribe.

301. Urtica (Nettle) Most of the species of this genus are armed
with stinging hairs which produce intense pain when they touch
a person's skin. Some of them are so venomous as to cause danger-
ous inflammations or even death. None are used in medicine.
302. Humulus lupulus (Hops) Euc. The ripe fertile anthers are
Hops. They are bitter & are said also to be narcotic but this is doubtful.
303. Ficus (Fig) The juice of some species is poisonous. Of that
others' yields Cannabis.

J. Carica. (Common Fig) As. Fruit slightly aperient: used for confections.

In the East the dried leaves are often mixed with Tobacco for smoking.
305. Morus (Mulberry) nigra. Persia (Black Mulberry) Fruit coloring of leaves.
306. Strychnos (Contrayerva). - The official article is produced
by several S. American species & W. Indian species, particularly by D.
Contrayerva, & 2. Brasiliensis.
307. Anthoxanthum toxicaria. Save, ya (Upsy) A most virulent poison

Order Amentaceae. Suborder Betuleae. The Birch Tribe
(This, & the other suborders of Amentaceae should have followed
Salicinaceae on the preceding page.)

308. Betula (Birch) lentis (Cherry Birch) The bark is aromatic.

Suborder Cupuliferae. The Nut Tribe.
310. Quercus (Oak) The bark of most of the species is highly as-
trigent. 2. Tinctoria (Black Oak) yields quercitron bark.
2. Injectoria, &s. minor, produces gallnut.

Suborder Myricaceae. The Gale Tribe.
311. Myrica Gale, Euc. (Sweet Gale). Infusion used for itch of a venem.
2. cerifera (Bayberry) Bark of the root a radical astrigent; also emet.
312. Comptonia asplenifolia (Sweet Fern) Tonic & astrigent.

Suborder Pyroclavescens.
313. Liquidambar styraciflua (Sweet-gum). In the Southern
State, it yields a fragrant tinct. which contains no benzoin acid.
The liquid borne of the tree is produced by L. occidentis & L. orientalis.
Medical Botany.

Order Juglandaceae. The Walnut Tribe.
314. Juglans cinerea (Butternut). Extract of the bark a mild cathartic.

Order Ulmaceae. The Elm Tribe.
315. Ulmus (Elm). The inner bark of several species is demulcent and mucilaginous. U. fulva affords the slippery Elm of the shops.

Order Ceycladaceae.
316. Cycas revoluta (Cycas). C. cincinnati, S.I. produce a kind of Sago.
317. Zamia. The trunk of several W. Indian species yields a sort of arrowroot, a beautiful white fascia is obtained of Z. integrifolia: a native of Florida; this last is the Coontie of the Seminole Indians.

Order Coniferae. The Fir Tribe.
318. Pinus (Pine) silvestris, &c. (Balsam Fir) yields Turpentine.
- P. Pinaster, &c. Produces Hungarian balsam.
- P. Pinus, &c. Produces Porteous turpentine.
- P. Pinus radiata (Yellow Pine) produces most of the American turpentine, from which Purest of Turpentine is distilled.
319. Abies (Spruce or Larch) picea, &c. (Silver Fir) produces Stavsburgh Turpentine.
- A. balsamea (Balsam or Pine) yields Canada Balsam.
- A. Canadensis (Hemlock Spruce) yields Osmanthus, Diuret, &c.
- L. Larix, &c. (Common Larch) produces Venice turpentine.

320. Juniperus communis, &c. (Common Juniper) berries thin, diuret.
- J. Virginiana (Red Cedar) strongly resembles Seave.
- J. Sabina, &c. (Savine) externally subfusco; & virid.: intern. commen.

Suborder Taxaceae. The Yew Tribe.
321. Taxus baccata, &c. (European Yew) leaves y seeds, narcotic.
- T. Canadensis seems to have similar properties to the European Yew.

Class II. Endogenae

Subclass 1. Phananthae
Fungoid parasitical plants

Order Balanophoraceae
322. Cynomorium cocineum, &c. Formerly said as an astringent, under the name of Fungus molitensis.
Medical Botany

Subclass II. Floridae
Leafy plants with the floral envelopes verticillate.

Order Scitamineae. The Ginger Tribe.
323. Zingiber officinale. S. The rhizome is ginger.
324. Curcuma. Zerumbet. S. & E. India. As. produce
Zedoary, a substance resembling ginger, but milder.
C. longa. E. S. produce Turmeric.
325. Amomum. Cardamomum. S. & E. Said to produce the round Cardamoms.
327. Alpinia. Galanga. Sumatra. The root are Galanga, major of
the tribe -- a pungent acid aromatic.

Order Orchidaceae. The Orchid Tribe.
328. Orchis. Several species of this genus produce saffron.
329. Vanilla. clavulata. W. S. produce the fragrant Vanilla of commerce.

Order Marantaceae. The Arrowroot Tribe.

Order Musaceae. The Banana Tribe.
331. Musa. sapientum. W. S. (Banana) & E. paradisica. E. S. (Plantain)
produce large, fleshly nutritious fruits.

Order Amaryllidaceae. The Amaryllis Tribe.
332. Several genera of this order produce poisonous bulbs. In the
common Narcissus & Daffodil the poison made is so diluted among
its parts as to prove such or catalyst.

Order Dioscoreaceae. The Yam Tribe.
The roots of several species of Dioscorea are used instead of Potatoes,
yet are known by the name of Yams. Dioscorea is equal to that of Dipsacus.
333. Dioscorea communis. E. S. Root acid.
Medical Botany

Order Iridaceae. The Flag Tribe.
1. Crocus sativus, in. Saffron is the large stigma of this plant.
2. Iris (Flag) florentina, in. The rhizome is Orris root. Aromatics.
3. pseudacorus, in. Rhizome acid, purgative of stomach.

Order Bromeliaceae. The Pineapple Tribe.

Order Smilaceae. The Smilax Tribe.
5. Smilax. Several tropical species of this genus are used in the officinal Sarsaparilla, but only one species seems to yield the genuine drug. Most of the officinal article is spurious of inert. S. Sarsaparilla does not appear to be medicinal. The rhizome of S. hastata probably of other species, yields a reddish glue which the Florida Indians prepare in large quantities for food.
6. China produces the China root of the sarsaparilla.
7. Brasil. The rhizomes are used in the diet drinks of irregular conditions in the Southern States.

Order Liliaceae. The Lily Tribe.
8. Erythronium americanum (Dogtooth Violet) Root 			 	stem emetic
10. Scilla maritima, var. (Fisch). bulbs emetic, diuretic, expectorant.
11. Allium cepa, var.它可以. (Onion) Simulant, diuretic, expectorant.
12. Patavinum, var. local irritant: internally stem, expectorant, diuretic.
13. Sisyrinchium, var. more than the preceding.
15. Vulgaris, var. Yields Barbados, or Hesperid, aloes.
16. Alpina, var. Yields Cape aloes, 

Order Melanthaceae. The Calliaceum Tribe.
17. Veratrum viride (Green Hellebore) Root, acid, emetic and power-fully stimulant: followed by sedative effects.
18. album, var. (White Hellebore) Resembles the preceding.
19. angustifolium, active like the preceding.
20. Sabadilla, var. Yields Sabadilla seeds, a source of the vegetable alkaline Veratrine, a violent local stimulant, used in gout, rheumatism, etc.
345. Adonis (Blazing Star) Root tonic & anthelmintic.
346. Schoenocaulon officinale, Mexico. Produces a root that looks like radish.

Order Trilliaceae.
346. Trillium erectum, grandiflorum yf. Root said to be violently emetic but the "unlicensed faculty" say they are astringent tonic of alternation.
347. Medeola Virginica (Indian Cucumber) Diuretic; hydropugue.

Order Palmaeae. The Palm Tribe.
348. Sagés lepis, Simum of Malaccas (Taro Palm) The cellular part of the trunk, & that of Isochima produce sugar. The next 349. Caryota urens, 5.3, are the principal sources of Sage.
351. Phoenix dactylifera, W. I. produces Date.

Order Araceae. The Aroo Tribe.
352. Aroo maculatum, Su. (Wake Robin) Tubers farinaceous, mixed with a volatile acid poison. The latter is removed by heat of washing leaving a kind ofecal called Portland Sago.
353. Triphyllum (Indian Turnip). Rhizome violently acid; dried army becomes of karnlep.
354. Symplocarpus foetidus (Skunk Cabbage). Root of seed anthelmintic.

Order Acoracea eae. The Sweet-Flag Tribe.
356. Acorus Calamus, Su. The rhizome is called Calamus or Sweet Flag.

Subclass III. Glumaceae.
Leafy plants with the floral envelopes imbricated.

Order Gramineae. The Grass Tribe.
357. Lolium temulentum, Su. (Darnel) Seeds a narcotic poison.
358. Triticum vulgare, As. (Wheat) The principal source of starch.
358. Hordeum vulgare, As. (Barley) Pearl barley is official.
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360. Bromus (Brome grass) molis, L. Narcotes.
B. terrestris of Cuthbert's, L. a grain said to be emmenogy.
361. Avena sativa (Oat). Oat meal is a light nourishing kind of food.
362. Andropogon (Beard Grass) Some species aromatic.
363. Saccharum (Sugar cane) Shenese, China. Produces Chinese Sugar.

S. officinaleum, S. Produces common Sugar.

Order Cyperaceae. The Sedge Tribe.
364. Cyperus (Galangale). A few species produce bitter, which contain fucule, a mild astrigent, & a feeble aromatic principle.
364. Barox (Sedge) The creeping stems of several species are said to be diaphoretic, demulcent of alteratives, & are known in Europe by the name of German Sopanephera.

Flowerless Plants

Class III. Althegamous or Semi-vascular Plants.

Order Lycopodiaceae. The club moss tribe.
365. Lycopodium (Club moss) clavatum, Eu. The spores of the thread are called Lycopodium used to cure Plica palmaris, & to prevent excoriations in children.

L. Selago, Eu. Internally an emetic; externally used as a counter-irritant, in the form of ointment; also to keep blisters open.

Order Filices. The Fern Tribe.
The rhizomes of some are astringent, & occasionally aromatic.
367. Adiantum (Maidenhair) Capillus Venarum, Eu. Pectoral; used to make the Supp Captallaire.†

A pediatium. Said to be pectoral & lentic.
368. Pteris Aquilina, Eu. (Common Brake) Anthelmintic.†
369. Asplenium (Shield Fern) Filix mas, Eu. Anthelmintic. The oil of Fern is extracted from the rhizomes by ether.
370. Aspidium acrostichodes. Said to be anthelmintic.
371. Osmunda regalis, Eu. (Osmund Royal) Rhizome tonic of styptic.
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Class IV. Amphibious or Cellular Plants.

Order Fungiaceae. The Fungus Tribe.

372. Ergoticia abortivencis. The fungus that produces the diseased condition of the grains of Rye, known by the name of Ergot. See a paper by Mr. Ousegret, in the Linnaean Transactions, Vol. XVII.

373. Pachyma Cocos. A subterranean fungus of Jamaica, called Fuchskasei. (Sclerotium gigas.) Torrey in Med. Repos., 1819, used medicinally in the South, but the properties are not well ascertained. Consists almost entirely of Peptonic Acid.

374. Tubera Cibarium, syn. A subterranean fungus called Truffle.

375. Agaricaceae. An immense genus, including several edible species; the principal one of which is Stropharia, or Common Mushroom. Many species are highly poisonous. Several produce a kind of intoxication.

Order Licheneceae. The Lichen Tribe.

376. Cetraria Icelandic, or (Iceland Moss) bitter and gelatinous.

377. Gymnoma, several large species of this genus constitute the tribe de Recherche of the Canadians—a bitter bitter of graying, but nutritious, substance.


378. Fucus vesiculosus, or (Sea ornament) used in Soups. This of other Fuci are probably efficacious from the iodine which they contain.

379. Chondrus crispus, or (Carrageen or Irish Moss) yields a mild nutritive jelly.
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