THE

NATURAL ORDERS OF PLANTS.

Class I. VASCULARES, or FLOWERING PLANTS.

Cotyledoneæ, *Juss. Gen.* p. 70. (1789.)— Embryonatæ, *Richard. Anal.* p. 50. (1808.) — Vasculares, *Dec. Fl. Fr.* 1. 68. (1815); *Lindl. Synops.* p. 3. (1829.)— Phanerogamous *or* Phænogamous Plants *of authors.*

Essential Character. — Substance of the plant composed of cellular tissue, woody fibre, ducts, and spiral vessels. *Leaves* composed of parenchyma, and of veins consisting of woody fibre and spiral vessels. *Cuticle* with stomata. *Flowers* consisting of floral envelopes, stamens, and pistilla. *Seeds* distinctly attached to a placenta, covered with a testa, and containing an embryo with one or more cotyledons; germinating at two fixed points, the plumula and radicle.

The presence of flowers, of spiral vessels, and of cuticular stomata, will at all times distinguish these from Cellulares, or flowerless plants, in which ducts sometimes exist, but which never have spiral vessels. Vasculares approach Cellulares by Podostemeæ, some of which resemble Azolla in habit, by Fluviales, which are near Algæ, especially by Coniferæ and Cycadeæ, which are closely akin to Lycopodiaceæ and Filices, and also by Casuarina, which must, in any natural ordination, stand near Equisetaceæ. Besides the more obvious points of difference just adverted to, Vasculares differ from Cellulares in their embryo; not, however, in the number of the cotyledons, as is generally supposed in consequence of the common names of Dicotyledones, Monocotyledones, and Acotyledones, but in the germination of the seeds of the two former always taking place from two fixed points, and in the latter from no fixed point.

Vasculares are divided into the sub-classes *Exogenæ* or *Dicotyledonous*, and *Endogenæ* or *Monocotyledonous* plants.

Sub-Class I. EXOGENÆ, or DICOTYLEDONS.

Dicotyledones, *Juss. Gen.* 70. (1789); *Desf. Mem. Inst.* 1. 478. (1796.)— Exorhizeæ *and* Synorhizeæ, *Rich. Anal.* (1808.)— Dicotyledoneæ *or* Exogenæ, *Dec. Theor.* p. 209. (1813.)—Phanerocotyledoneæ *or* Seminiferæ, *Agardh. Aph.* 74. (1821.)

Essential Character. — *Trunk* more or less conical, consisting of three parts, one within the other; viz. bark, wood, and pith, of which the wood is enclosed within the two others; increasing by an annual deposit of new wood and cortical matter between the wood and bark. *Leaves* always articulated with the stem, often opposite, their veins branching and reticulated. *Flowers*, if with a distinct calyx, often having a quinary division. *Embryo* with two or more opposite cotyledons, which often become green and leaf-like after germination; radicle naked, *i.e.* elongating into a root without penetrating any external case.

Their reticulated leaves, distinctly articulated with the stem, usually distinguish these plants from Endogenæ, from which they are also known by the following points: Exogenæ have a distinct deposition of pith, wood, and bark; Endogenæ have all these confounded: Exogenæ, if trees, are conical and branched (example, an Oak); Endogenæ are cylindrical and simple-

stemmed (example, a Palm). Besides which, the following characters, although far less absolute, deserve attention: Exogenæ in germination protrude their radicle at once; while in Endogenæ it is contained within the substance of the embryo, through which it ultimately bursts: Exogenæ have two or more cotyledons; Endogenæ have but one. Exogenæ approach Endogenæ by Grasses and Asphodeleæ, which branch like themselves, and by Smilaceæ and Aroideæ, which have foliage resembling that of many Exogenæ. The number of divisions of their flower is hardly ever ternary, but usually some multiple of two, or four, or five. In this country the trees and shrubs, and larger herbaceous plants, are nearly all Exogenous; while our native Endogenæ are chiefly confined to grasses, sedges, orchises, bulbs, and submerged water-plants.

Exogenous plants have their seeds either enclosed in a pericarpium (*Angiospermæ*), or naked (*Gymnospermæ*).

TRIBE I. ANGIOSPERMÆ.

These comprehend all Exogenous plants the seeds of which are enclosed within a pod, or shell, or coat proceeding from the ovarium; in short, the whole of that sub-class, with the exception of Cycadeæ and Coniferæ. They are all fecundated through the medium of a stigma and style; while Gymnospermæ, having no stigma or style, have the vivifying influence of the pollen communicated directly to the seed through its foramen. The latter must not be confounded with the naked-seeded plants of Linnæus, which all belong to Angiospermæ, and which are either minute fruits, or divisions of a compound pistillum: they are always known by the presence of a style and stigma.

This tribe is divided into *Polypetalous*, *Apetalous*, *Achlamydeous*, and *Monopetalous* plants; of which the first three may be considered extremely artificial divisions if taken separately, but forming together a tolerably natural whole; while the Monopetalous division is also, in a great measure, natural. I shall therefore treat of Exogenæ under two heads only.

1. POLYPETALOUS, APETALOUS, AND ACHLAMYDEOUS PLANTS.

Polypetalous plants have both a calyx and corolla; Apetalous plants have only a calyx, without a corolla; and Achlamydeous ones have neither: but these distinctions are merely artificial, and even in that point of view very imperfect,—Polypetalous orders constantly containing Apetalous genera, and orders with the strictest natural affinity differing in the absence or presence of floral envelopes. Even Decandolle himself suggests (*Mémoire sur les Combretacées*, p. 2), that it is doubtful whether the division of Monochlamydeæ (which are the same as Apetalæ) is not entirely artificial.

While, therefore, I have availed myself of these differences in framing the diagnoses, and forming the artificial table, I have, in the following detailed account of the orders, thrown the three divisions together, so that the mutual relations of the orders may be obscured as little as possible. In using the artificial tables, if an Apetalous plant cannot be referred to any order of Apetalæ, its place should be sought for among Polypetalæ, to some order of which it will probably be found to be an exception: it is very little likely to belong to Monopetalæ, the Apetalous genera of which are extremely rare. There are no plants of Achlamydeæ with a calyx except some Betulineæ, the flowers of which have a membranous veinless covering, of the nature of a calyx.

These orders pass into Monopetalæ through Caprifoliaceæ, among which Hedera is nearly allied to Araliaceæ, and through Salicariæ which are very near Labiatæ, Meliaceæ which touch upon Styraceæ, and Passifloreæ which stand next to Cucurbitaceæ.

LIST OF THE ORDERS.

1. Araliaceæ.
2. Umbelliferæ.
3. Ranunculaceæ.
4. Papaveraceæ.
5. Nymphæaceæ.
6. Nelumboneæ.
7. Hydropeltideæ.
8. Podophylleæ.
9. Cruciferæ.
10. Fumariaceæ.
11. Capparideæ.
12. Flacourtianeæ.
13. Anonaceæ.
14. Myristiceæ.
15. Magnoliaceæ.
16. Dilleniaceæ.
17. Winтereæ.
18. Calycantheæ.
19. Monimieæ.
20. Atherospermeæ.
21. Laurineæ.
22. Berberideæ.
23. Menispermeæ.
24. Malvaceæ.
25. Chlenaceæ.
26. Bombaceæ.
27. Sterculiaceæ.
28. Moringeæ.
29. Tiliaceæ.
30. Elæocarpeæ.
31. Dipterocarpeæ.
32. Ternströmiaceæ.
33. Lecythideæ.
34. Guttiferæ.
35. Marcgraaviaceæ.
36. Hypericineæ.
37. Reaumurieæ.
38. Saxifrageæ.
39. Cunoniaceæ.
40. Baueraceæ.
41. Bruniaceæ.
42. Hamamelideæ.
43. Philadelpheæ.
44. Escallonieæ.
45. Grossulaceæ.
46. Cacti.
47. Onagrariæ.
48. Haloragеæ.
49. Circæaceæ.
50. Hydrocaryes.
51. Loaseæ.
52. Salicariæ.
53. Rhizophoreæ.
54. Melastomaceæ.
55. Memecyleæ.
56. Myrtaceæ.
57. Combretaceæ.
58. Alangieæ.
59. Elæagneæ.
60. Proteaceæ.
61. Penæaceæ.
62. Aristolochiæ.
63. Cytineæ.
64. Santalaceæ.
65. Thymelææ.
66. Hernandieæ.
67. Aquilarineæ.
68. Olacineæ.
69. Chailletiaceæ.
70. Homalineæ.
71. Samydeæ.
72. Sanguisorbeæ.
73. Rosaceæ
74. Pomaceæ.
75. Amygdaleæ.
76. Chrysobalaneæ.
77. Leguminosæ.
78. Urticeæ.
79. Ulmaceæ.
80. Artocarpeæ.
81. Stilagineæ.
82. Cupuliferæ.
83. Betulineæ.
84. Salicineæ.
85. Plataneæ.
86. Myriceæ.
87. Juglandeæ.
88. Euphorbiaceæ.
89. Resedaceæ.
90. Datisceæ.
91. Empetreæ.
92. Stackhouseæ.
93. Celastrineæ.
94. Hippocrateaceæ.
95. Brexiaceæ.
96. Rhamneæ.
97. Staphyleaceæ.
98. Hippocastaneæ.
99. Rhizoboleæ.
100. Sapindaceæ.
101. Acerineæ.
102. Erythroxyleæ.
103. Malpighiaceæ.
104. Vites.
105. Meliaceæ.
106. Cedreleæ.
107. Humiriaceæ.
108. Aurantiaceæ.
109. Spondiaceæ.
110. Connaraceæ.
111. Amyrideæ.
112. Burseraceæ.
113. Anacardiaceæ.
114. Xanthoxyleæ.
115. Diosmeæ.
116. Rutaceæ.
117. Coriarieæ.
118. Ochnaceæ.
119. Zygophylleæ.
120. Simarubaceæ.
121. Pittosporeæ.
122. Geraniaceæ.
123. Oxalideæ.
124. Tropæoleæ.
125. Hydrocereæ.
126. Balsamineæ.
127. Vochyaceæ.
128. Tremandreæ.
129. Polygaleæ.
130. Violaceæ.
131. Passifloreæ.
132. Malesherbiaceæ.
133. Turneraceæ.
134. Cistineæ.
135. Bixineæ.
136. Sarracennieæ.
137. Droseraceæ.
138. Nepentheæ.
139. Lineæ.
140. Caryophylleæ.
141. Frankeniaceæ.
142. Tamariscineæ.
143 Elatineæ.
144. Portulaceæ.
145. Fouquieraceæ.
146. Galacineæ.
147. Crassulaceæ.
148. Ficoideæ.
149. Nitrariaceæ.
150. Illecebreæ.
151. Amarantaceæ.
152. Scleranthеæ.
153. Chenopodeæ.
154. Phytolacceæ.
155. Petiveraceæ.
156. Polygoneæ.
157. Begoniaceæ.
158. Nyctagineæ.
159. Saureureæ.
160. Chloranthеæ.
161. Lacistemeæ.
162. Piperaceæ.
163. Podostemeæ.
164. Callitrichineæ.
165. Ceratophylleæ.

I. ARALIACEÆ. The Aralia Tribe.

Araliæ, *Juss. Gen.* 217. (1789.) — Araliaceæ, *A. Richard in Dictionnaire Classique d'Histoire Naturelle*, 1. 506. (1822.)

Diagnosis. Polypetalous dicotyledons, with definite perigynous stamens, concrete carpella, an inferior ovarium of several cells, pendulous solitary ovula, leaves sheathing at the base, umbellate flowers, and embryo in the base of fleshy albumen.

Anomalies. None.

Essential Character. — *Calyx* superior, entire or toothed. *Petals* definite, 5 or 6, deciduous, valvate in æstivation. *Stamens* definite, 5 or 6, or 10 or 12, arising from within the border of the calyx, and from without an epigynous disk. *Ovarium* inferior, with more cells than 2; *ovula* solitary, pendulous; *styles* equal in number to the cells; *stigmas* simple. *Fruit* succulent, or dry, consisting of several 1-seeded cells. *Seeds* solitary, pendulous; *albumen* fleshy, having a minute *embryo* at the base, with its radicle pointing to the hilum. — *Trees*, *shrubs*, or *herbaceous* plants, with, in all respects, the habit of Umbelliferæ.

Affinities. Distinguished from Umbelliferæ solely by their many-celled fruit and more shrubby habit. Connected with Caprifoliaceæ through Hedera.

Geography. China, India, North America, and the Tropics of the New World, are the chief abodes of the species of this small order.

Properties. The Ginseng, which is the root of Panax quinquefolium, is much valued by the Chinese for its beneficial influence upon the nerves, and for other supposed properties. It is, however, discarded from European practice. *Ainslie*, 1. 154. There appears to be no reasonable doubt that the Ginseng has really an invigorating and stimulant power when fresh. The virtues that are ascribed to it by the Chinese, although perhaps imaginary to a great extent, are nevertheless founded upon a knowledge of its good effects; which, after the statements made by Father Jartoux, cannot reasonably be called in question. An aromatic gum resin is exuded by the bark of Aralia umbellifera, and others.

Examples. Aralia, Gastonia, Panax.

II. UMBELLIFERÆ. The Umbelliferous Tribe.

Umbelliferæ, *Juss. Gen.* 218. (1789); *Koch in N. Act. Bonn.* 12. 73. (1824); *Dec. and Duby*, p. 213. (1828); *Lindl. Synops.* 111. (1829); *Dec. Mémoire* (1829.)

Diagnosis. Polypetalous dicotyledons, with five perigynous stamens, concrete carpella, an inferior didymous ovarium with two styles and solitary pendulous ovula, leaves sheathing at the base, umbellate flowers, and a minute embryo in the base of fleshy albumen.

Anomalies. Sometimes there are three carpella.

Essential Character. — *Calyx* superior, either entire or 5-toothed. *Petals* 5, inserted on the outside of a fleshy disk; usually inflexed at the point; æstivation imbricate, rarely valvate. *Stamens* 5, alternate with the petals, incurved in æstivation. *Ovarium* inferior, 2-celled, with solitary pendulous ovula; crowned by a double fleshy disk; *styles* 2, distinct; *stigmata* simple. *Fruit* consisting of 2 carpella, separable from a common axis, to which they adhere by their face (*the commissure*); each carpellum traversed by elevated *ridges*, of which 5 are primary, and 4, alternating with them, secondary; the ridges are separated by *channels*, below which are often placed, in the substance of the pericarp, certain linear receptacles of coloured oily matter, called *vittæ*. *Seed* pendulous, usually adhering inseparably to the pericarpium, rarely loose; *embryo* minute, at the base of abundant horny *albumen*; *radicle* pointing to the hilum. — *Herbaceous* plants, with fistular furrowed

stems. *Leaves* usually divided, sometimes simple, sheathing at the base. *Flowers* in umbels, white, pink, yellow, or blue, generally surrounded by an involucrum.

AFFINITIES. It is unnecessary to insist upon the relation of this order and Araliaceæ, which scarcely differ. With Saxifrageæ it agrees in habit, if Hydrocotyle is compared with Chrysosplenium, and if the sheathing and divided leaves of the two orders are considered. To Geraniaceæ, Decandolle remarks that they are allied, in consequence of the cohesion of the carpella around a woody axis, and of the umbellate flowers which grow opposite the leaves, and also because the affinity of Geraniaceæ to Vites, and of the latter to Araliaceæ, is not to be doubted. To me it appears, that the most certain affinity of Umbelliferæ is with Ranunculaceæ, with which they agree in habit, in properties, in the presence of a large quantity of albumen, of solitary seeds in the carpella, a minute embryo, and distinct styles; and from which they differ in their inferior fruit and definite perigynous stamens, rather than in any thing else of real importance. The arrangement of this order has only within a few years arrived at any very definite state; the characters upon which genera and tribes could be formed were for a long while unsettled: it is, however, now generally admitted, that the number and development of the ribs of the fruit, the presence or absence of reservoirs of oil called vittæ, and the form of the albumen, are the leading peculiarities which require to be attended to. Upon this subject see Koch's *Dissertation*, Lagasca in the *Otiosas Españolas*, and Decandolle's *Mémoire*, — especially the last. I do not give the characters of the sub-orders or tribes, because they are rather to be considered artificial divisions than natural groups.

GEOGRAPHY. Natives chiefly of the northern parts of the northern hemisphere, inhabiting groves, thickets, plains, marshes, and waste places. According to the investigation of M. Decandolle, the following is the proportion of the order found in different parts of the world:—

In the Old World.....	663	In the northern hemisphere	679
In America	159	In the southern ditto.....	205
In Australia.....	54		
In scattered islands	14		

PROPERTIES. The properties of this order require to be considered under two points of view: firstly, those of the vegetation; and, secondly, those of the fructification. The character of the former is, generally speaking, suspicious, and often poisonous in a high degree; as in the case of Hemlock, Fool's Parsley, and others, which are deadly poisons. Nevertheless, the stems of the Celery, the leaves of Parsley and Samphire, the roots of the Skirret, the Carrot, the Parsnep, and the tubers of Œnanthe pimpinelloides and Bunium bulbocastanum, are wholesome articles of food. The fruit, vulgarly called the seeds, is in no case dangerous, and is usually a warm and agreeable aromatic, as Caraway, Coriander, Dill, Anise, &c. From the stem, when wounded, sometimes flows a stimulant, tonic, aromatic, gum-resinous concretion, of much use in medicine; as Opoponax, which is procured from Pastinaca opoponax in the Levant, and Assafœtida from the Ferula of that name in Persia. Gum ammoniac is supposed to be obtained from Heracleum gummiferum. It is a gum resin of a pale yellow colour, having a faint but not unpleasant odour, with a bitter, nauseous taste. Internally applied, it is a valuable deobstruent and expectorant. It is said by Dr. Paris to be, in combination with rhubarb, a useful medicine in mesenteric affections, by correcting viscid secretions. *Ainslie*, 1. 160. The substance called Galbanum is produced by some plant of this order, which is supposed to be what botanists call Bubon Galbanum. It is a stimulant of the intestinal canal and uterus, and is found to allay that nervous irritability which often accompanies hysteria. *Ainslie*, 1. 143. Æthusa

Cynapium has been found by Professor Ficinus, of Dresden, to contain a peculiar alkali, which he calls Cynopia. *Turner*, 654. The fruit of Ligusticum ajawain of *Roxb.* is prescribed in India in diseases of horses and cows. *Ainslie*, 1. 38.

Examples. Chærophyllum, Pastinaca, Eryngium, Hydrocotyle, &c.

III. RANUNCULACEÆ. The Crow-Foot Tribe.

Ranunculi, *Juss. Gen.* (1789.) — Ranunculaceæ, *Dec. Syst.* 1. 127. (1818); *Prodr.* 1. 2. (1824); *Lindl. Synops.* p. 7. (1829.)

Diagnosis. Polypetalous dicotyledons, with hypogynous stamens, anthers bursting by longitudinal slits, several distinct simple carpella, exstipulate leaves sheathing at their base, solid albumen, and seeds without arillus.

Anomalies. In Garidella and Nigella the carpella cohere more or less. In Thalictrum, some species of Clematis, and some other genera, there are no petals. Pæonia has a persistent calyx.

Essential Character. — *Sepals* 3-6, hypogynous, deciduous, generally imbricate in æstivation, occasionally valvate or duplicate. *Petals* 5-15, hypogynous, in one or more rows, distinct, sometimes deformed in correspondence with metamorphosis in the stamens. *Stamens* indefinite in number, hypogynous; *anthers* adnate, in the true genera turned outwards. *Pistilla* numerous, seated on a torus, 1-celled or united into a single many-celled pistillum; *ovarium* one or more seeded, the *ovula* adhering to the inner edge; *style* one to each ovarium, short, simple. *Fruit* either consisting of dry nuts or caryopsides, or baccate with one or more seeds, or follicular with one or two valves. *Seeds* albuminous; when solitary, either erect or pendulous. *Embryo* minute. *Albumen* corneous. — *Herbs*, or very rarely *shrubs*. *Leaves* alternate or opposite, generally divided, with the petiole dilated and forming a sheath half clasping the stem. *Hairs*, if any, simple. *Inflorescence* variable.

Affinities. This is an order which has a strong affinity with many others, some of which are widely apart from each other. Its most immediate resemblance is with Dilleniaceæ, Magnoliaceæ, and their allies, to which it approaches in the position, number, and structure of its parts of fructification generally, differing however in an abundance of particulars; as from Dilleniaceæ, in the want of arillus, deciduous calyx, and whole habit; from Magnoliaceæ, in the want of stipulæ, and sensible qualities; from Papaveraceæ and Nymphæaceæ, in the distinct, not concrete, carpella, watery, not milky, fluids, acrid, not narcotic, properties. More distant analogy may be traced with Rosaceæ, with which they agree in their numerous carpella, the number of their floral divisions and indefinite stamens; but differ in those stamens being hypogynous instead of perigynous, in the presence of large albumen surrounding a minute embryo, want of stipulæ and acrid properties. With Umbelliferæ they accord in the last particular, and also in their sheathing leaves, habit, and abundant albumen, with a minute embryo; but those plants differ in their calyx being concrete with the ovarium, and in their stamens being invariably definite; no doubt, however, can be entertained, that in any really natural arrangement Ranunculaceæ and Umbelliferæ should be placed near each other. Another analogy has been indicated by botanists between this order and Alismaceæ, with which it agrees in its numerous ovaria, and in habit; but that order is monocotyledonous. A great peculiarity of Ranunculaceæ consists in the strong tendency exhibited by many of the genera to produce their sepals, petals, and stamens, in a state different from that of other plants; as, for example, in Delphinium, Aquilegia, and Aconitum, in which they are furnished with

a spur, and in Ranunculus itself, which has a nectariferous gland at the base of the petals. An instance is described of the polypetalous regular corolla of Clematis viticella being changed into a monopetalous irregular one, like that of Labiatæ. *Nov. Act. Acad. N. C.* 14. p. 642. t. 37.

GEOGRAPHY. The largest proportion of this order is found in Europe, which contains more than 1-5th of the whole; North America possesses about 1-7th, India 1-25th, South America 1-17th; very few are found in Africa, except upon the shores of the Mediterranean: eighteen species have, according to Decandolle, been discovered in New Holland. They characterise a cold damp climate, and are, when met with in the Tropics, found inhabiting the sides and summits of lofty mountains: in the lowland of hot countries they are almost unknown.

PROPERTIES. Acridity, causticity, and poison, are the general characters of this suspicious order, which, however, contains species in which those qualities are so little developed as to be innoxious. The caustic principle is, according to Krapfen, as cited by Decandolle, of a very singular nature; it is so volatile that, in most cases, simple drying, infusion in water, or boiling, are sufficient to dissipate it: it is neither acid nor alkaline: it is increased by acids, sugar, honey, wine, spirit, &c. and is only effectually destroyed by water. The leaves of Knowltonia vesicatoria are used as vesicatories in Southern Africa. Ranunculus glacialis is a powerful sudorific; Aconitum Napellus and Cammarum are diuretic. The Hepatica, Actæa racemosa, and Delphinium consolida, are regarded as simple astringents. *Dec.* The roots of several Hellebores are drastic purgatives; those of the perennial Adonises are, according to Pallas, emmenagogues; and those of several Aconitums, especially Napellus and Cammarum, are acrid in a high degree. *Ibid.* The root of the Aconitum of India, one of the substances called Bikh, or Bish, is a most virulent poison. *Trans. Med. and Phil. Soc. Calc.* 2. 407. Authors are, however, not well agreed what the precise plant is which produces this Bikh, although all agree in referring it to Ranunculaceæ. In India, it seems there are three principal kinds of Bish, varying from each other in their properties, but all belonging to a genus which Dr. Hamilton refers to Caltha. According to this author, the Bishma, or Bikhma, is a strong bitter, very powerful in the cure of fevers: the Bish, Bikh, or Kodoya Bikh, has a root possessing poisonous properties of the most dreadful kind, whether taken into the stomach, or applied to wounds: the Nir Bishi, or Nirbikhi, has no deleterious properties, but is used in medicine. *Brewster*, 1. 250. For some important information on this Bikh, Vish, Visha, or Ativisha, which Dr. Wallich considers his Aconitum ferox, see *Plant. As. Rar.* vol. 1. p. 33. tab. 41. The root of Pæony is acrid and bitter, but is said to possess antispasmodic properties. Ranunculus flammula and sceleratus are powerful epispastics, and are used as such in the Hebrides, producing a blister in about an hour and a half. Their action is, however, too violent, and the blisters are difficult to heal, being apt to pass into irritable ulcers. *Ed. Ph. J.* 6. 156. Beggars use them for the purpose of forming artificial ulcers, and also the leaves of Clematis recta and flammula. From the seeds of Delphinium staphysagria, the chemical principle called Delphine was procured by MM. Lassaigne and Fenuelle; it exists in union with oxalic acid. *Ibid.* 3. 305. The root of Hydrastis canadensis has a strong and somewhat narcotic smell, and is exceedingly bitter; it is used in North America as a tonic, under the name of *Yellow root*. *Barton*, 2. 21. The root of Coptis trifolia, or Gold-thread, is a pure and powerful bitter, devoid of any thing like astringency; it is a popular remedy in the United States for aphthous affections of the mouth in children. *Ibid.* 2. 100. The wood and bark of Xanthorhiza apiifolia are a very pure tonic bitter. The

shrub contains both a gum and resin, each of which is intensely bitter. *Ibid.* 2. 205. The seeds of Nigella sativa were formerly employed instead of pepper; those of Delphinium Staphisagria are vermifugal and caustic; those of Aquilegia are simply tonic. *Dec.*

M. Decandolle makes the following divisions in this order:—

I. TRUE RANUNCULACEÆ.

Anthers bursting outwardly.

§ 1. Clematideæ.

Dec. Syst. 1. 131. (1818); *Prodr.* 1. 2. (1824.)

Æstivation of the calyx valvate, or induplicate. *Petals* none, or plane. *Carpella* indehiscent, 1-seeded, terminated by a bearded tail (which is the indurated style). *Seed* pendulous. *Leaves* opposite.

Examples. Clematis, Naravelia.

§ 2. Anemoneæ.

Dec. Syst. 1. 168. (1818); *Prodr.* 1. 10. (1824.)

Æstivation of calyx and corolla imbricated. *Petals* none, or plane. *Carpella* 1-seeded, indehiscent, usually terminated by a tail or point. *Seed* pendulous. *Leaves* radical, or alternate.

Examples. Anemone, Thalictrum.

§ 3. Ranunculeæ.

Dec. Syst. 1. 228. (1818); *Prodr.* 1. 25. (1824.)

Æstivation of calyx and corolla imbricated. *Petals* 2-lipped, or furnished with an interior scale at the base. *Carpella* 1-seeded, dry, indehiscent. *Seed* erect. *Leaves* radical, or alternate.

Examples. Ranunculus, Myosurus.

§ 4. Helleboreæ.

Dec. Syst. 1. 306. (1818); *Prodr.* 1. 44. (1824.)

Æstivation of calyx and corolla imbricated. *Petals* either none, or irregular, 2-lipped, and nectariferous. *Calyx* petaloid. *Carpella* capsular, dehiscent, many-seeded.

Examples. Eranthis, Trollius, Aconitum.

II. SPURIOUS RANUNCULACEÆ.

Anthers bursting inwardly.

Examples. Actæa, Xanthorhiza, Pæonia.

IV. PAPAVERACEÆ. The Poppy Tribe.

Papaveraceæ, *Juss. Gen.* 236. (1789) *in part*; *Dec. Syst.* 2. 67. (1818); *Prodr.* 1. 117. (1824); *Lindl. Synops.* 16. (1829.)

Diagnosis. Polypetalous dicotyledons, with hypogynous stamens, concrete carpella, a 1-celled ovarium, narrow parietal placentæ, 2 sepals, and a regular corolla.

Anomalies. Bocconia has no petals, and a monospermous capsule. Hypecoum has the inner petals 3-lobed. Eschscholtzia has perigynous stamens.

Essential Character. — *Sepals* 2, deciduous. *Petals* hypogynous, either 4, or some multiple of that number, placed in a cruciate manner. *Stamens* hypogynous, either 8,

or some multiple of 4, generally very numerous, inserted in 4 parcels, one of which adheres to the base of each petal; *anthers* 2-celled, innate. *Ovarium* solitary; *style* short, or none; *stigmas* alternate with the placentæ, 2 or many; in the latter case stellate upon the flat apex of the ovarium. *Fruit* 1-celled, either pod-shaped, with 2 parietal placentæ, or capsular, with several placentæ. *Seeds* numerous; *albumen* between fleshy and oily; *embryo* minute, straight, at the base of the albumen, with plano-convex *cotyledons*.—*Herbaceous plants* or *shrubs*, with a milky juice. *Leaves* alternate, more or less divided. *Peduncles* long, 1-flowered; *flowers* never blue.

Affinities. The siliquose-fruited genera, such as Glaucium and Eschscholtzia, indicate the near affinity of this order to Cruciferæ, from which they differ in the want of a dissepiment to the fruit, in the stamens being indefinite, and in the presence of copious albumen. Through Papaver they approach Nymphæaceæ, and through Sanguinaria Podophylleæ, from all which they are distinguished with facility. Their relationship to Fumariaceæ is more obscure, and is only to be understood by considering Cruciferæ to be their connecting link. The anomalies in the order are of little importance, with the exception of Eschscholtzia, which has its stamens arising from the throat of a flatly campanulate calyx, instead of being hypogynous: this plant, however, may, instead of being an exception to the character, be considered as affording a proof that all is not calyx which intervenes between the base of the sepals and the base of the ovarium. I conceive that it would be more natural to understand the apparent base of the calyx of Eschscholtzia as a hollow apex of the peduncle; but if this be admitted, it will become doubtful whether many supposed tubes of the calyx are not hollowed peduncles also; as, for example, Calycanthus, Rosa, Scleranthus, Margyricarpus, &c. I have already made some remarks upon this subject in the Introduction, which see. A comparison of the structure of Papaveraceæ and Cruciferæ, by Mirbel, is to be found in the *Ann. des Sc.* 6. 266.

Geography. Europe, in all directions, is the principal seat of Papaveraceæ, almost two-thirds of the whole order being found in it. Two species only are, according to Decandolle, peculiar to Siberia, three to China and Japan, one to the Cape of Good Hope, one to New Holland, and six to Tropical America. Several are found in North America, beyond the tropic; and it is probable that the order will yet receive many additions from that region. Most of them are annuals. The perennials are chiefly natives of mountainous tracts.

Properties. Every one knows what narcotic properties are possessed by the poppy, and this character prevails generally in the order. Their seed is universally oily, and in no degree narcotic. The oil obtained from the seeds of Papaver somniferum is found to be perfectly wholesome, and is, in fact, consumed on the continent in considerable quantity. It is also employed extensively for adulterating olive oil. Its use was at one time prohibited in France by decrees issued in compliance with popular clamour; but it is now openly sold, the government and people having both grown wiser. *See Ed. P. J.* 2. 17. Meconopsis napalensis, a Nipal plant, is described as being extremely poisonous, especially its roots. *Don. Prodr.* 98. The Sanguinaria canadensis, or Puccoon, is emetic and purgative in large doses, and in smaller quantities is stimulant, diaphoretic, and expectorant. *Barton*, 1. 37. The seeds of Argemone mexicana are used in the West Indies as a substitute for ipecacuanha; and the juice is considered by the native doctors of India as a valuable remedy in ophthalmia, dropt into the eye and over the tarsus; also as a good application to chancres. It is purgative and deobstruent. *Ainslie*, 2. 43. The Brazilians administer the juice of their Cardo santo, Argemone mexicana, to persons or animals bitten by serpents, but, it would appear, without much success. *Prince Max. Trav.* 214. The narcotic principle of opium is an alkaline substance, called Morphia. The same drug

contains a peculiar acid, called the Meconic; and a vegetable alkali, named Narcotine, to which the unpleasant stimulating properties are attributed by Magendie. *Turner*, 6. 47.

EXAMPLES. Papaver, Chelidonium, Eschscholtzia.

V. NYMPHÆACEÆ. THE WATER LILY TRIBE.

NYMPHÆACEÆ, *Salisbury*, *Ann. Bot.* 2. p. 69. (1805); *Dec. Propr. Med. ed.* 2. p. 119. (1816); *Syst.* 2. 39. (1821); *Prodr.* 1. 113. (1824); *Lindl. Synops.* 15. (1829.)

DIAGNOSIS. Polypetalous dicotyledons, with hypogynous stamens, concrete carpella, a many-celled ovarium, and ovula attached to the face of the dissepiments.

ANOMALIES. None.

ESSENTIAL CHARACTER. — *Sepals* and *petals* numerous, imbricated, passing gradually into each other, the former persistent, the latter inserted upon the disk which surrounds the pistillum. *Stamens* numerous, inserted above the petals into the disk, sometimes forming, with the combined petals, a superior monopetalous corolla; *filaments* petaloid; *anthers* adnate, bursting inwards by a double longitudinal cleft. *Disk* large, fleshy, surrounding the ovarium more or less. *Ovarium* polyspermous, many-celled, with the stigmata radiating from a common centre upon a sort of flat urceolate cap. *Fruit* many-celled, indehiscent. *Seeds* very numerous, attached to spongy dissepiments, and enveloped in a gelatinous arillus. *Albumen* farinaceous. *Embryo* small, on the outside of the base of the albumen, enclosed in a membranous bag; *cotyledons* foliaceous.—*Herbs*, with peltate or cordate fleshy leaves, arising from a prostrate trunk, growing in quiet waters.

AFFINITIES. There exists a great diversity of opinion among botanists as to the real structure of this order, and, consequently, as to its affinities. This has arisen chiefly from the anomalous nature of the embryo, which is not naked, as in most plants, but enclosed in a membranous sac or bag. By some, among whom was the late M. Richard, this sac or bag was considered a cotyledon, analogous to that of grasses, and enveloping the plumula; and hence the order was referred to Endogenæ, or Monocotyledons, and placed in the vicinity of Hydrocharideæ. By others, at the head of whom are Messrs. Mirbel and Decandolle, the sac is considered a membrane of a peculiar kind; and what Richard and his followers denominate plumula, is for them a 2-lobed embryo, wherefore they place the order in Exogenæ, or Dicotyledons. I do not think it worth citing all the arguments that have been adduced on each side the question, as botanists seem now to be generally agreed upon referring Nymphæaceæ to Dicotyledons. I observe, however, that Dr. Von Martius adheres to the opinion that Nymphæaceæ are monocotyledonous, and nearly related to Hydrocharideæ. See *Hortus Regius Monacensis*, p. 25. (1829.) Those who are curious to investigate the subject are referred to M. Decandolle's Memoir, in the first volume of the Transactions of the Physical and Natural History Society of Geneva. In this place it will be sufficient to advert briefly to the proof that is supposed to exist of their being Dicotyledons. In the first place, the structure of the stem is essentially that of Exogenæ. See Mirbel's examination of the anatomy of Nuphar luteum, in the *Annales du Muséum*, vol. 16. p. 20; and of Nelumbium, the close affinity of which with Nymphæaceæ no one can possibly doubt, in the same work, vol. 13. t. 34. In both these plants the bundles of fibres are placed in concentric circles, the youngest of which are outermost; but they all lie among a great quantity of cellular tissue: between each of these circles is interposed a number of air-cells, just as is found in Myriophyllum and Hippuris, both undoubted Dicotyledons in the opinion of every body