ANALYTICAL KEY TO THE ORDERS. — As stated in Dr. Gray's Preface to the last edition, this is designed to enable the student to refer readily to its proper Order any of our plants, upon taking the pains to ascertain the structure of its flowers, and sometimes of the fruit, and by following out a series of easy steps in the analysis. It is founded upon the most obvious distinctions which will answer the purpose, and is so contrived as to provide for all or nearly all exceptional instances and variant cases. Referring to the Order which the Key leads him to, the student will find its most distinctive points brought together and printed in Italics in the first sentence of the ordinal description, and thus can verify his results. The Synopsis which follows will then lead him to the genus, to be verified in turn by the full generic description in its place; and the progress thence to the species is facilitated, when there are several to choose from, by the arrangement under divisions and subdivisions, as already explained.

It will be seen that the Key directs the inquirer to ascertain, first, the Class of the plant under consideration, — which, even without the seeds, is revealed at once by the plan of the stem, as seen in a cross-section, and usually by the veining of the leaves, and is commonly confirmed by the numerical plan of the flower; — then, if of the first Class, the Subclass is at once determined by the pistil, whether of the ordinary kind, or an open scale bearing naked ovules. If the former, then the choice between the three Divisions is determined by the presence or absence of the petals, and whether separate or united. Each Division is subdivided by equally obvious characters, and, finally, a series of successively subordinated propositions, — each set more indented upon the page than the preceding, — leads to the name of the Order sought for, followed by the number of the page upon which it is described in the body of the work.

The book is now submitted to those for whose benefit it has been prepared, in the trust that its shortcomings will meet with friendly indulgence, and with the earnest request that information be kindly given of any corrections or additions that may appear to be necessary.

SERENO WATSON.

CAMBRIDGE, MASS., Dec. 26, 1889.

SYNOPSIS OF THE ORDERS OF PLANTS

DESCRIBED IN THIS WORK.

SERIES I. PHÆNOGAMOUS OR FLOWERING PLANTS: those producing real flowers and seeds.

CLASS I. DICOTYLEDONOUS OR EXOGENOUS PLANTS.

Stems formed of bark, wood, and pith; the wood forming a zone between the other two, and increasing, when the stem continues from year to year, by the annual addition of a new layer to the outside, next the bark. Leaves netted-veined. Embryo with a pair of opposite cotyledons, or in Subclass II. often three or more in a whorl. Parts of the flower mostly in fours or fives.

SUBCLASS I. ANGIOSPERMÆ. Pistil consisting of a closed ovary which contains the ovules and becomes the fruit. Cotyledons only two.

DIVISION I. POLYPETALOUS: the calyx and corolla both present; the latter of *separate* petals. (Apetalous flowers occur in various Orders, as noted under the subdivisions.)

A. THALAMIFLORÆ. Stamens and petals hypogynous (free both from the calyx and from the superior ovary), upon a usually narrow receptacle (not glandular nor discoid, except in Reseda, sometimes stipe-like). (Stamens and petals upon the partly inferior ovary in some Nymphæaceæ.) Apetalous flowers occur in the Ranunculaceæ and Caryophyllaceæ.

* 1. Carpels solitary or distinct (or coherent in Magnoliaceæ); sepals and petals deciduous (except in Nymphæaceæ); leaves alternate or radical, without stipules (sometimes opposite or whorled and rarely stipular in Ranunculaceæ); embryo (except in Nelumbo) small, in fleshy albumen

1. **Ranunculaceæ** (p. 34). Sepals (3 or more), petals (as many, in regular flowers, or none), stamens (usually many), and carpels (1 – many) all distinct. Fruit achenes, follicles, or berries. Mostly herbs.
2. **Magnoliaceæ** (p. 49). Sepals and petals colored alike, in three or more rows of three, imbricate. Fruit cone-like, formed of the numerous cohering pistils. Trees.
3. **Anonaceæ** (p. 50). Sepals (3) and petals (6, in two rows) valvate. Fruit pulpy. Shrubs or small trees.
4. **Menispermaceæ** (p. 51). Sepals and petals in twos or threes, imbricate. Pistils becoming 1-seeded drupes. Dicœcious woody climbers, with palmate or peltate leaves.

5. **Berberidaceæ** (p. 52). Sepals and petals imbricate, each in two rows of three (rarely in twos or fours). Stamens opposite the petals. Pistil solitary, becoming a berry or pod. Shrubs or low herbs.

6. **Nymphæaceæ**, in part (p. 54). Sepals and petals each 3, or many in several rows. Pistils becoming coriaceous and indehiscent. Aquatics; floating leaves peltate.

* 2. Carpels (2 or more) united into a compound ovary with parietal, often nerve-like placentæ (or the seeds covering the inner surface in Nymphæaceæ, and the placentæ axile in Sarraceniaceæ). Herbs (some Cistaceæ somewhat shrubby).

+ Fruit 5 – many-celled; calyx or whole perianth persistent; embryo small, at the base of fleshy albumen.

6. **Nymphæaceæ** proper (p. 54). Sepals 2 – 6. Petals and stamens numerous, on a thick hypogynous receptacle or inserted upon the ovary. Capsule 8 – 30-celled. Aquatics, with peltate or cordate leaves.

7. **Sarraceniaceæ** (p. 57). Sepals and petals 5. Capsule 5-celled. Marsh plants, with pitcher-shaped leaves.

+ + Fruit 1-celled, or spuriously 2 – more-celled by partitions connecting the placentæ.

++ Embryo minute at the base of fleshy albumen; perianth deciduous; sepals 2.

8. **Papaveraceæ** (p. 57.) Flowers regular. Sepals fugacious. Petals 4 – 12. Stamens and seeds numerous. Capsule 2 – several-valved. Juice milky or colored.

9. **Fumariaceæ** (p. 59.) Flowers irregular. Petals 4, in dissimilar pairs. Stamens 6, diadelphous. Fruit 2-valved (indehiscent and 1-seeded in Fumaria). Juice watery; leaves dissected.

++ ++ Albumen none; embryo curved or folded; perianth deciduous (sepals persistent in Resedaceæ).

10. **Cruciferæ** (p. 61). Sepals and petals 4. Stamens mostly 6, tetradynamous (two inserted lower and shorter). Pod 2-celled by a transverse partition, 2-valved, or sometimes indehiscent or transversely jointed. Bracts and stipules none.

11. **Capparidaceæ** (p. 74). Sepals and petals 4. Stamens 6 or more, nearly equal. Pod 1-celled, 2-valved. Embryo coiled. Leaves often palmately divided; bracts and stipules often present.

12. **Resedaceæ** (p. 75). Sepals and petals 4 – 7, irregular. Stamens indefinite on an hypogynous disk, not covered in the bud. Pod 1-celled, 3 – 6-lobed, opening at the top.

++ ++ ++ Embryo rather large in fleshy albumen; placentæ on the middle of the valves; calyx persistent.

13. **Cistaceæ** (p. 76). Flowers regular; sepals and petals 5, the two outer sepals minute. Stamens indefinite. Pod 1-celled, 3 – 5-valved. Ovules orthotropous. Embryo curved. Leaves entire, the lower often opposite.

14. **Violaceæ** (p. 78). Flowers irregular; sepals and petals 5. Stamens 5, with connivent introrse anthers. Style clavate. Pod 1-celled, 3-valved. Ovules anatropous. Embryo straight. Stipules present.

* 3. Ovary compound, 1-celled, with central placentæ; embryo curved around mealy albumen (except in Dianthus); leaves entire; stipules mostly none.

15. **Caryophyllaceæ** (p. 82). Sepals (5, rarely 4) distinct or united, persistent. Petals as many, rarely none. Stamens as many or twice as many, rarely fewer. Styles 2 – 5. Leaves opposite.

16. **Portulacaceæ** (p. 90). Sepals 2. Petals 5. Stamens 5 – 20. Capsule 3-valved or circumscissile. Fleshy herbs; leaves mostly alternate.

* 4. Calyx imbricate; stamens as many or twice as many as the petals or often indefinite; ovary compound, 1-celled with parietal placentæ or several-celled with the placentæ united in the axis; embryo straight or slightly curved; albumen none or scanty.

17. **Elatinaceæ** (p. 91). Small marsh annuals, with opposite leaves, membranous stipules, minute axillary flowers, few stamens, and pod 2 – 5-celled.

18. **Hypericaceæ** (p. 92). Herbs or shrubs, with opposite entire dotted leaves and no stipules. Flowers cymose or panicled. Stamens few or many, usually in 3 or more clusters. Pod 1-celled or 3 – 5-celled.

19. **Ternstrœmiaceæ** (p. 95). Trees or shrubs, with alternate leaves and no stipules. Flowers large, axillary, solitary. Stamens numerous, more or less united together and with the base of the petals. Pod 3 – 5-celled.

* 5. Calyx valvate; stamens numerous, usually more or less united together and with the base of the petals; ovary 3 – many-celled with the placentæ united in the axis (becoming 1-celled and 1-seeded in Tilia).

20. **Malvaceæ** (p. 96). Stamens monadelphous; anthers 1-celled. Calyx persistent. Seeds kidney-shaped, with curved embryo and little albumen. Herbs or shrubs, with alternate palmately veined stipular leaves.

21. **Tiliaceæ** (p. 101). Stamens polyadelphous or nearly distinct; anthers 2-celled. Calyx deciduous. Embryo nearly straight. Trees, with alternate leaves and deciduous stipules.

B. DISCIFLORÆ. Stamens as many as the petals or twice as many or fewer, inserted upon or at the outer or inner base of a more or less tumid hypogynous or perigynous disk, which is cushion-like or annular or divided into glands, sometimes obscure or minute (or none in Linum, Ilex, some Geraniaceæ and Polygala); ovary superior (or half-inferior in some Rhamnaceæ); sepals more usually distinct. Petals wanting in some Rutaceæ, Rhamnaceæ, and Sapindaceæ.

* 1. Ovules (mostly 1 or 2 in each cell) pendulous, with the rhaphe toward the axis of the ovary; disk often reduced to glands alternate with the petals or none; ovary often lobed or the carpels nearly distinct.

22. **Linaceæ** (p. 101). Flowers regular, usually 5-merous. Capsule not lobed, mostly 5-valved, spuriously 10-celled, 10-seeded. Stamens united at base. Disk none or 5 minute glands. Herbs, with entire alternate or opposite leaves; stipules gland-like or none.

23. **Geraniaceæ** (p. 102). Flowers regular or irregular, 5-merous or 3-merous as to the stamens and pistils. Ovary 3 – 5-lobed, the cells 1 – few-ovuled, and axis persistent. Disk of 5 glands or none. Herbs, with often lobed or divided mostly alternate leaves, with or without stipules.

24. **Rutaceæ** (p. 106). Flowers mostly regular, 3–5-merous, diœcious or polygamous in our genera. Ovary 2–5-lobed or the carpels nearly distinct, upon a glandular disk; cells 2-ovuled. Mostly shrubs or trees, with glandular-punctate compound leaves, without stipules.

* 2. Ovules (1 or 2) pendulous, the rhaphe away from the axis; disk none and ovary not lobed.

25. **Ilicineæ** (p. 107). Flowers small, diœciously polygamous, axillary, 4–8-merous. Fruit a 4–8-seeded berry-like drupe. Shrubs or trees, with simple alternate leaves and no stipules.

* 3. Ovules (1 or 2 in each cell) erect, the rhaphe toward the axis; disk fleshy, covering the base of the calyx; stamens as many as the petals, at the margin of the disk; flowers perfect or polygamo-diœcious; albumen fleshy; shrubs or trees, with simple leaves (compound in some Vitaceæ).

26. **Celastraceæ** (p. 109). Sepals and petals imbricated, the stamens alternate with the petals. Fruit 2–5-celled; seeds arilled.

27. **Rhamnaceæ** (p. 111). Calyx valvate. Petals small or none. Stamens alternate with the sepals. Fruit 2–5-celled; seeds solitary, not arilled.

28. **Vitaceæ** (p. 112). Calyx minute. Stamens opposite the valvate caducous petals. Climbing by tendrils opposite the alternate leaves.

* 4. Ovules (1 or 2) ascending or horizontal, or pendulous from a basal funicle; fleshy disk entire or lobed; stamens 5–10; shrubs or trees, with compound leaves (simple in Acer) and mostly polygamo-diœcious and often irregular flowers; petals imbricate (sometimes none in Sapindaceæ).

29. **Sapindaceæ** (p. 115). Flowers mostly unsymmetrical or irregular. Ovary 2–3-celled and -lobed.

30. **Anacardiaceæ** (p. 118). Flowers regular, 5-androus. Ovary 1-celled, becoming a small dry drupe. Leaves alternate; juice milky or resinous.

* 5. Ovules solitary, pendulous from the summit of the 2-celled ovary; disk none; flowers irregular (subpapilionaceous), hypogynous; stamens monadelphous or diadelphous; anthers 1-celled, opening by an apical pore.

31. **Polygalaceæ** (p. 120). Herbs, with perfect flowers and alternate or opposite or whorled entire leaves. Stamens 6–8. Seed carunculate.

C. CALYCIFLORÆ. Sepals rarely distinct; disk adnate to the base of the calyx, rarely tumid or conspicuous; petals and stamens on the calyx, perigynous or epigynous, the ovary being often inferior (hypogynous in Drosera and Parnassia, nearly so in some Leguminosæ and Crassulaceæ). Apetalous flowers in Orders 33, 35, 36, 38, 39, 41, 42, 47, and 50.

* 1. Ovary usually superior, the pistils solitary, or several and distinct (sometimes more or less united but at least the styles distinct except in some Saxifragaceæ).

32. **Leguminosæ** (p. 122). Flowers papilionaceous or regular. Stamens usually 10, and mostly monadelphous or diadelphous. Pistil one, free, becoming a legume; style terminal. Albumen none. Leaves mostly compound, alternate, stipular.

33. **Rosaceæ** (p. 150). Flowers regular, with usually numerous distinct stamens, and 1–many pistils, distinct or (in Pomeæ) united and combined with the calyx-tube; style often lateral or basal. Calyx-lobes and petals mostly 5. Ovules mostly 1 or 2. Albumen mostly none. Trees, shrubs, or herbs; leaves usually alternate and stipulate, simple or compound.

34. **Calycanthaceæ** (p. 167). Calyx-lobes, petals, and stamens indefinite. Pistils numerous, becoming achenes in a hollow receptacle. Albumen none. Aromatic shrubs, with opposite entire leaves and no stipules.

35. **Saxifragaceæ** (p. 168). Flowers regular, with 5–10 stamens (numerous in Philadelphus), few (mostly 2) more or less united, free or partially adnate carpels, and few–many ovules on axile or sometimes parietal placentæ. Seeds albuminous. Herbs or shrubs, with opposite or alternate leaves, with or without stipules.

36. **Crassulaceæ** (p. 170). Mostly fleshy herbs, with symmetrical flowers, the usually distinct many-seeded carpels as many as the sepals. Seeds albuminous. Leaves alternate or opposite or whorled; stipules none.

37. **Droseraceæ** (p. 178). Glandular-haired scapose marsh herbs, with regular 5-merous hypogynous flowers. Capsule 1-celled, with 3–5 many-seeded parietal placentæ. Anthers extrorse. Leaves circinate in vernation.

38. **Hamamelideæ** (p. 179). Shrubs or trees; flowers often polygamo-monœcious, in clusters, heads, or spikes; petals often none. Seeds 2 or more, bony, in a 2-beaked woody pod opening above, the base adnate to the calyx-tube. Stamens few or many. Leaves alternate, simple.

39. **Haloragеæ** (p. 180). Aquatic or marsh herbs; flowers perfect or polygamo-diœcious, small, axillary or spicate; petals often none. Stamens 1–8. Ovary inferior, the calyx-limb obsolete or very short. Fruit small, indehiscent, 1–4-celled, 1–4-seeded. Leaves alternate or opposite, the submersed often dissected.

* 2. Ovary inferior (except in Lythraceæ), 1–several-celled; style entire; flowers perfect, regular or nearly so, mostly 4-merous; herbs, with simple and mostly entire leaves without stipules.

40. **Melastomaceæ** (p. 183). Calyx open. Stamens definite; anthers opening by an apical pore. Leaves opposite, 3–7-nerved; flowers cymose.

41. **Lythraceæ** (p. 184). Calyx-lobes valvate. Pod free, but enclosed in the calyx, membranous, 1–4-celled, many-seeded with axile placentæ. Leaves mostly opposite; flowers axillary or whorled; petals crumpled, or none.

42. **Onagraceæ** (p. 186). Calyx-lobes valvate. Ovary 1–4-celled, the cells 1–many-ovuled. Stamens 2, 4, or 8. Petals 2 or 4, convolute, or none Leaves opposite or alternate.

* 3. Ovary inferior (except in Passifloraceæ and Ficoideæ), 1-celled with parietal placentæ or several-celled by the intrusion of the placentæ; flowers regular, perfect or unisexual; styles free or united; herbs.

+ Embryo straight; cotyledons foliaceous; leaves alternate, often lobed.

43. **Loasaceæ** (p. 193). Flowers perfect. Stamens indefinite. Style entire or 2–3-cleft. Capsule 1-celled, with 2 or 3 many-seeded placentæ. Pubescence of hooked hairs.

44. **Passifloraceæ** (p. 194). Climbing by tendrils. Flowers perfect. Stamens 5, monadelphous. Ovary stalked, superior, becoming a 1-celled many-seeded berry with 3 or 4 placentæ. Styles 3, clavate.

45. **Cucurbitaceæ** (p. 194). Tendril-bearing vines, with diœcious or monœcious flowers. Corolla 5-lobed, often confluent with the calyx. Stamens 3 or 5, usually more or less united and the anthers often tortuous. Fruit fleshy or membranous, 1–5-celled, the placentæ often produced to the axis and revolute. Seeds exalbuminous.

+– +– Embryo curved or coiled about central albumen; leaves entire.

46. **Cactaceæ** (p. 196). Fleshy and mostly leafless prickly plants, with solitary sessile perfect flowers. Calyx-lobes and petals indefinite, imbricated, the numerous stamens on the tube. Fruit a 1-celled many-seeded berry.

47. **Ficoideæ** (p. 198). Calyx-lobes or sepals 5 and petals none in our genera. Capsule 3–5-celled with axile placentæ, loculicidal or circumscissile, many-seeded. Often fleshy; leaves mostly opposite or verticillate.

* 4. Flowers small, regular, perfect or polygamous; calyx-limb minute or obsolete; ovary inferior, 2–several-celled, with solitary pendulous ovules; petals and stamens mostly 4 or 5, on the margin of an epigynous disk surrounding the styles; albumen copious.

48. **Umbelliferæ** (p. 198). Flowers in umbels or heads. Petals (inflexed) and stamens 5. Styles 2. Fruit of 2 dry seed-like carpels, the pericarp usually with oil-tubes. Herbs, with alternate mostly compound leaves.

49. **Araliaceæ** (p. 212). Flowers mostly in umbels and nearly as in Umbelliferæ; petals not inflexed and styles 2 or more. Fruit a 2–several-celled drupe. Herbs or shrubs, with alternate mostly compound leaves.

50. **Cornaceæ** (p. 213). Flowers not in umbels; petals (valvate, or none) and stamens 4 or 5. Style 1. Fruit a 1–2-seeded drupe. Trees, shrubs, or rarely herbs, with opposite or alternate simple and mostly entire leaves.

DIVISION II. GAMOPETALOUS: calyx and corolla both present, the latter of united petals (excepting some **Ericaceæ**, Styracaceæ, and Oleaceæ, Galax, Statice, and Lysimachia). Apetalous flowers occur in Glaux and some Oleaceæ. Stipules present only in Rubiaceæ and Loganiaceæ, or rarely in Caprifoliaceæ.

* 1. Ovary inferior; stamens borne upon the corolla, alternate with its lobes.

+– Stamens distinct; leaves opposite or whorled; seed albuminous except in Valerianaceæ.

51. **Caprifoliaceæ** (p. 216). Corolla mostly 5-lobed, regular or irregular, the stamens as many (one fewer in Linnæa, doubled in Adoxa). Ovary 1–several-celled; fruit a berry, drupe, or pod, 1–several-seeded. Shrubs or herbs; leaves opposite, rarely stipular, not turning black in drying.

52. **Rubiaceæ** (p. 222). Flowers regular, 4–5-merous, the corolla mostly valvate. Ovary 2–4-celled. Herbs or shrubs; leaves simple, entire, opposite with stipules, or verticillate, usually turning black in drying.

53. **Valerianaceæ** (p. 228). Stamens (1–4) fewer than the lobes of the somewhat irregular corolla. Ovary with two abortive or empty cells and one containing a suspended ovule. Fruit dry and indehiscent. Herbs.

54. **Dipsaceæ** (p. 229). Flowers mostly 4-merous and with 4 (rarely 2) stamens, involucellate in involucrate heads; corolla-lobes imbricate. Ovary simple, 1-celled, with a suspended ovule. Herbs.

+– +– Anthers connate into a tube.

55. **Compositæ** (p. 230). Stamens as many as the valvate corolla-lobes. Ovary with a solitary erect ovule, becoming an achene. Albumen none. Calyx-limb reduced to a pappus or none. Flowers in involucrate heads.

* 2. Ovary inferior (or superior in most Ericaceæ and in Diapensiaceæ); stamens free from the corolla or nearly so (adnate in some Diapensiaceæ), as many as the lobes and alternate with them, or twice as many; leaves alternate (opposite in some Ericaceæ); style 1.

+– Juice milky; capsule 2–5-celled, many-seeded; herbs.

56. **Lobeliaceæ** (p. 305). Corolla irregular, 5-lobed. Stamens united, at least by the anthers. Capsule 2-celled or with two placentæ.

57. **Campanulaceæ** (p. 307). Corolla regular, 5-lobed, valvate. Stamens usually distinct. Capsule 2–several-celled.

+– +– Juice not milky nor acrid; capsule 3–10-celled.

58. **Ericaceæ** (p. 309). Flowers mostly regular, 4–5-merous. Stamens distinct, more usually twice as many as the corolla-lobes or petals. Ovary inferior or superior. Herbs or shrubs.

59. **Diapensiaceæ** (p. 326). Flowers regular. Stamens 5, on the corolla, or monadelphous with 5 petaloid staminodia. Ovary superior, 3-celled.

* 3. Ovary superior; stamens as many as the corolla-lobes and opposite them.

60. **Plumbaginaceæ** (p. 327). Stamens 5, on the base of the petals. Styles 5. Fruit an achene or 1-seeded utricle. Herbs; leaves radical.

61. **Primulaceæ** (p. 328). Stamens 4–8, perigynous. Style 1. Fruit a capsule with several seeds on a central placenta. Herbs; leaves radical or opposite or alternate.

62. **Sapotaceæ** (p. 332). Flowers small, 4–5-merous. Style 1. Ovary few–several-celled; fruit fleshy, bearing a single bony-coated seed. Shrubs or trees, with milky juice and alternate entire leaves.

* 4. Ovary superior or more or less adnate to the calyx, few–several-celled, the cells 1-ovuled; stamens twice as many as the corolla-lobes or more; trees or shrubs, with alternate leaves.

63. **Ebenaceæ** (p. 333). Flowers diœcious or polygamous Stamens on the corolla. Ovary superior. Styles distinct Fruit fleshy, few-seeded.

64. **Styracaceæ** (p. 333). Flowers perfect. Stamens subhypogynous. Ovary more or less inferior. Style 1. Fruit dry or nearly so, 1–4-seeded.

* 5. Ovary superior, of two carpels (sometimes by division apparently 4-carpellary, sometimes of 3–5 in Polemoniaceæ, Convolvulaceæ, and Solanaceæ); stamens on the corolla (except in apetalous Oleaceæ), alternate with its lobes, as many or fewer.

+– Corolla not scarious and nerveless.

++ Corolla none, or regular and 4-cleft or -parted, the stamens fewer than its lobes; style 1; seeds 1–3.

65. **Oleaceæ** (p. 335). Trees or shrubs, with opposite and pinnate or simple leaves. Flowers perfect or polygamo-diœcious. Stamens mostly 2, alternate with the usually 2-ovuled carpels.

++ ++ Corolla regular, its lobes 4 – 5 or rarely more; stamens as many.

= Ovaries 2, becoming follicles; stigmas and sometimes the styles united; herbs with milky juice, perfect 5-merous flowers, and simple entire leaves.

66. **Apocynaceæ** (p. 337). Stamens distinct or the anthers merely connivent, with ordinary pollen. Style 1.

67. **Asclepiadaceæ** (p. 338). Stamens monadelphous, the anthers permanently attached to a large stigmatic body; pollen mostly in waxy masses. Styles distinct below the stigma.

= = Ovary compound (ovaries two in Dichondra), with 2 or 3 (rarely 4 or 5) cells or placentæ; stamens distinct; mostly herbs.

a. Leaves opposite; corolla-lobes 4 or 5 or more.

68. **Loganiaceæ** (p. 345). Leaves entire, with stipules or a stipular line joining their bases. Capsule 2-celled, few – many-seeded. Herbs or woody twiners (our species).

69. **Gentianaceæ** (p. 346). Glabrous herbs; leaves entire, sessile and simple (except in Menyanthes). Capsule 1-celled with 2 parietal placentæ or the whole inner surface ovuliferous, many-seeded.

b. Leaves alternate (sometimes opposite in Polemoniaceæ and Hydrophyllaceæ); corolla-lobes always 5 in our species.

70. **Polemoniaceæ** (p. 354). Capsule usually 3-celled, loculicidal; seeds 1 – many in each cell on the stout placental axis. Style 3-cleft or -lobed. Leaves opposite or alternate, simple or compound.

71. **Hydrophyllaceæ** (p. 357). Leaves often lobed or divided, and the inflorescence frequently scorpioid. Style 2-parted or 2-lobed. Capsule 1-celled, 2-valved with two parietal or introflexed placentæ, or sometimes 2-celled. Seeds 2 or more on each placenta.

72. **Borraginaceæ** (p. 360). Leaves mostly entire and plants often rough-hispid; inflorescence commonly scorpioid. Style 1. Ovary 4-ovulate, usually 4-lobed and maturing as 4 separate or separable nutlets, or not lobed, 2 – 4-celled and separating when ripe into 2 or 4 nutlets.

73. **Convolvulaceæ** (p. 367). Usually twining or trailing; flowers on axillary peduncles or cymose-glomerate. Corolla 5-lobed or 5-plaited, twisted in the bud. Styles 1 or 2. Ovary 2- (sometimes 3- or spuriously 4-) celled, becoming a globular 4 – 6-seeded capsule (or ovaries two and distinct in Dichondra). Cotyledons broad-foliaceous.

74. **Solanaceæ** (p. 373). Style 1. Ovary 2-celled (rarely 3 – 5-celled), with numerous ovules on axillary placentæ, becoming a pod or berry. Cotyledons narrow.

++ ++ ++ Corolla more or less bilabiately irregular (sometimes nearly regular), 5-lobed. Fertile stamens 4 and didynamous, or 2. Style 1. Ovary always of two carpels.

a. Ovules several or many.

75. **Scrophulariaceæ** (p. 377). Capsule 2-celled, with central placentæ. Seeds small, usually numerous. Herbs; leaves alternate or opposite.

76. **Orobanchaceæ** (p. 393). Root-parasites with no green foliage. Capsule 1-celled, with 2 simple or double parietal placentæ. Seeds many.

77. **Lentibulariaceæ** (p. 395). Aquatic or marsh herbs, with scapes or scape-like peduncles, sometimes nearly leafless. Corolla personate and spurred. Capsule globular, 1-celled; placentæ central, free, many-seeded.

78. **Bignoniaceæ** (p. 398). Large-flowered trees or often climbing shrubs, with usually opposite simple or compound leaves. Capsule 2-celled by a partition between the 2 parietal placentæ. Seeds numerous, large, mostly winged.

79. **Pedaliaceæ** (p. 399). Herbs, with opposite simple leaves. Ovary 1-celled with two bilamellar parietal placentæ, or 2 – 4-celled by their union, becoming drupaceous or capsular. Seeds few or many, wingless.

80. **Acanthaceæ** (p. 399). Herbs, with opposite simple leaves. Capsule 2-celled, loculicidal, with each axile placenta bearing 2 – 10 flattish seeds.

b. Cells of the ovary 1 – 2-ovuled; herbs or low shrubs, with opposite leaves

81. **Verbenaceæ** (p. 401). Ovary 2 – 4-celled, not lobed, the dry or drupaceous fruit separating into 2 or 4 1-seeded nutlets (fruit 1-celled and 1-seeded in Phryma). Style terminal.

82. **Labiatæ** (p. 403). Ovary deeply 4-lobed around the style, the lobes becoming dry seed-like nutlets. Stems square; aromatic.

+– +– Corolla scarious and nerveless; flowers regular, 4-merous; style 1.

83. **Plantaginaceæ** (p. 422). Scapose herbs, with perfect or polygamo-dicœcious or monœcious flowers in 1 – many-flowered spikes. Fruit a circumscissile 2-celled capsule, with one or more peltate seeds in each cell, or an achene.

DIVISION III. APETALOUS EXOGENS. The corolla wanting (except in some Euphorbiaceæ), and sometimes also the calyx.

* 1. Ovary superior (though sometimes enclosed within the calyx), 1-celled with a solitary basal ovule (several-celled in Phytolaccaceæ); embryo coiled or curved (nearly straight in Polygonaceæ) in or about mealy albumen (albumen none in some Chenopodiaceæ); herbs.

+– Fruit the hardened or membranous closed base of the corolla-like perianth enclosing a utricle.

84. **Nyctaginaceæ** (p. 425). Perianth tubular or funnelform. Stamens hypogynous. Fruit ribbed or winged. Leaves opposite; stipules none.

+– +– Fruit a utricle; perianth mostly persistent, small, 4 – 5-lobed or -parted, or none.

85. **Illecebraceæ** (p. 426). Perianth herbaceous. Stamens perigynous. Leaves opposite; stipules scarious (none in Scleranthus).

86. **Amarantaceæ** (p. 427). Flowers sessile, bracteate, the bracts (usually 3) more or less dry and scarious, as well as the 3 – 5 distinct sepals. Stamens 1 – 5, hypogynous. Utricle indehiscent or circumscissile. Embryo annular. Leaves mostly alternate, entire; stipules none.

87. **Chenopodiaceæ** (p. 430). Flowers sessile, not scarious-bracteate. Sepals greenish or succulent, 5 or fewer, or none. Stamens 5 or fewer, perigynous or hypogynous. Embryo annular or spiral or conduplicate. Leaves alternate; stipules none.

+ + + Ovary of several 1-ovuled carpels, in fruit a berry (in our genera).

88. **Phytolaccaceæ** (p. 435). Sepals 4–5, petaloid or herbaceous. Stamens 5–30, hypogynous. Carpels 5–12. Embryo annular. Leaves alternate, entire; stipules none.

+ + + + Fruit a triangular or lenticular achene.

89. **Polygonaceæ** (p. 436). Flowers on jointed pedicels. Calyx 3–6-lobed or -parted, more or less corolla-like. Stamens 4–12, on the calyx. Embryo nearly straight. Leaves alternate, with sheathing stipules or none.

* 2. Ovary compound, the cells many-ovuled (or 1-ovuled in Piperaceæ); embryo minute in copious albumen; flowers perfect.

90. **Podostemaceæ** (p. 444). Aquatic, with the aspect of sea-weeds or mosses, with minute naked flowers from a spathe-like involucre. Ovary superior; pod 2–3-celled.

91. **Aristolochiaceæ** (p. 444). Terrestrial herbs or climbing shrubs. Calyx valvate, adnate at least at base to the 6-celled many-seeded ovary. Stamens 6–12, more or less united with the style. Leaves alternate, mostly cordate; stipules none.

92. **Piperaceæ** (§ Saurureæ), (p. 446). Marsh herb (our species). Perianth none. Carpels 3–4, distinct, with usually a single ascending seed. Leaves alternate, entire.

* 3. Ovary superior, simple, 1-celled, 1-ovuled, forming a berry or drupe; trees or shrubs, with mostly entire leaves and no stipules.

93. **Lauraceæ** (p. 446). Flowers perfect or diœcious. Sepals 4 or 6, in 2 rows. Stamens 9–12; anthers opening by 2 or 4 uplifted valves. Seed suspended; albumen none. Aromatic; leaves alternate.

94. **Thymelæaceæ** (p. 448). Flowers perfect. Calyx corolla-like, 4–5-cleft. Stamens twice as many. Seed suspended, with little or no albumen. Acrid shrubs with very tough bark; leaves alternate.

95. **Elæagnaceæ** (p. 448). Flowers mostly diœcious. Calyx-tube becoming berry-like and enclosing the achene. Seed erect, albuminous. Leaves silvery-scurfy, opposite.

* 4. Ovary inferior, 1-celled, 1–3-ovuled (but 1-seeded); albumen without testa, bearing the embryo in a cavity at the apex; calyx-lobes valvate.

96. **Loranthaceæ** (p. 449). Parasitic on trees, with jointed stems and opposite leaves. Flowers diœcious. Ovule solitary, erect. Fruit a berry.

97. **Santalaceæ** (p. 450). Flowers perfect. Ovules 2–4, suspended from the apex of a central placenta. Fruit dry, indehiscent. Leaves alternate.

* 5. Flowers all unisexual (polygamous in some Urticaceæ and Empetraceæ, apparently perfect in Euphorbia); cells 1–2-ovuled; embryo nearly as long as the albumen or filling the seed; calyx often wanting, corolla-like only in some Euphorbiaceæ and Empetraceæ; stipules often present.

+ 1. Ovary superior, 3-celled (1-celled in Crotonopsis) with 1 or 2 pendulous ovules in each cell; herbs.

98. **Euphorbiaceæ** (p. 451). Flowers monœcious or diœcious (involucrate and apparently perfect in Euphorbia). Mostly with milky juice, and usually alternate often stipulate leaves.

+ 2. Ovary 1-celled, 1-seeded; trees or shrubs (except some Urticaceæ).

++ Calyx regular, the stamens as many as the lobes and opposite them or fewer; ovary superior.

99. **Urticaceæ** (p. 461). Flowers monœcious, diœcious, or (in Ulmeæ) perfect. Seeds exalbuminous or nearly so. Inflorescence very various.

++ ++ Perianth mostly none; at least the staminate flowers in aments or spikes or dense heads; albumen none.

100. **Platanaceæ** (p. 466). Trees, with alternate palmately lobed leaves, sheathing stipules, and monœcious flowers in separate globose heads. Ovary superior; fruit a club-shaped nutlet.

101. **Juglandaceæ** (p. 467). Trees, with alternate pinnate leaves, no stipules, and monœcious flowers, the staminate in aments. Ovary inferior; fruit a nut.

102. **Myricaceæ** (p. 469). Shrubs, with resinous-dotted leaves, with or without stipules, and monœcious or diœcious flowers, both kinds in short scaly aments. Ovary superior, becoming a small drupe-like nut.

+ 3. Ovary 2–7-celled, with 1 or 2 suspended ovules in each cell, becoming 1-celled and 1-seeded; calyx mostly none or adherent to the ovary; trees or shrubs with simple leaves.

103. **Cupuliferæ** (p. 470). Flowers monœcious. Fruit a nut surrounded by an involucre, or (in Betuleæ) a small winged or angled naked nutlet in the axils of the scales of an ament.

+ 4. Ovary 1-celled, becoming a 2-valved pod with two parietal or basal placentæ bearing numerous small comose seeds; perianth none.

104. **Salicaceæ** (p. 480). Diœcious trees or shrubs, with both kinds of flowers in aments, and simple alternate stipulate leaves.

+ 5. Ovary several-celled, becoming a drupe containing 3–9 1-seeded nutlets; seed erect; low shrubby heath-like evergreens.

105. **Empetraceæ** (p. 487). Flowers polygamous or diœcious, scaly-bracted. Sepals somewhat petaloid or none. Embryo axile in copious albumen.

+ 6. Ovary 1-celled with a suspended ovule, becoming an achene; calyx none; aquatic herbs, with finely dissected whorled leaves.

106. **Ceratophyllaceæ** (p. 488). Flowers monœcious, minute, axillary and sessile. Albumen none; the seed filled with a highly developed embryo.

SUBCLASS II. GYMNOSPERMOUS EXOGENS. Ovules naked upon a scale, bract, or disk. Cotyledons two or more.

107. **Coniferæ** (p. 489). Resiniferous trees or shrubs, with mostly awl-shaped or needle-shaped and evergreen leaves, and monœcious or diœcious flowers.

CLASS II. MONOCOTYLEDONOUS PLANTS.

Stems without central pith or annular layers, but having the woody fibres distributed irregularly through them (a transverse slice showing the fibres as dots scattered through the cellular tissue). Embryo with a single cotyledon and the early leaves always alternate. Parts of the

flower usually in threes (never in fives), and the leaves mostly parallel-veined. Our species herbaceous, excepting Smilax.

* Ovary inferior (superior in Bromeliaceæ, nearly so in some Hemodoraceæ); at least the inner lobes of the perianth petal-like.

+– 1. Seeds without albumen, very numerous and minute.

108. **Hydrocharidaceæ** (p. 495). Aquatics, with dicœcious or polygamous flowers from a spathe; outer perianth calyx-like, the inner sometimes wanting. Stamens 3–12. Ovary 1-celled with 3 parietal placentæ or 6–9-celled with axile placentæ.

109. **Burmanniaceæ** (p. 496). Terrestrial, with scale-like cauline leaves and regular perfect triandrous flowers. Perianth corolla-like.

110. **Orchidaceæ** (p. 497). Terrestrial, with very irregular perfect flowers. Stamens and style connate; anthers 1 or 2. Capsule 1-celled; placentæ 3, parietal. Perianth corolla-like.

+– 2. Seeds albuminous. (Ovary 3-celled and flowers regular in our genera.)

111. **Bromeliaceæ** (p. 511). Mostly epiphytes, with dry persistent scurfy leaves. Flowers 6-androus; outer perianth calyx-like.

112. **Hemodoraceæ** (p. 512). Fibrous-rooted, with equitant leaves and perfect 3- or 6-androus flowers. Perianth persistent, woolly or scurfy outside. (Ovary sometimes nearly free; leaves flat in Aletris.)

113. **Iridaceæ** (p. 513). Root not bulbous; leaves equitant in two ranks. Flowers from a spathe. Stamens 3, opposite the outer lobes of the corolla-like perianth; anthers extrorse.

114. **Amaryllidaceæ** (p. 515). Often bulbous-rooted and scapose. Perianth corolla-like. Stamens 6; anthers introrse.

115. **Dioscoreaceæ** (p. 517). Climbing, with net-veined leaves. Flowers dicœcious, small, 6-androus; perianth calyx-like. Ovules 1 or 2 in each cell.

* * Ovary superior (very rarely partially adnate to the calyx in Liliaceæ).

+– 1. At least the inner perianth corolla-like; ovary compound; seeds with copious albumen.

116. **Liliaceæ** (p. 517). Flowers perfect, 6-androus, the regular perianth corolla-like (dicœcious in Smilax, dimerous in Maianthemum, the outer divisions herbaceous in Trillium). Fruit a 3-celled capsule or berry.

117. **Pontederiaceæ** (p. 535). Aquatic, with more or less irregular perfect flowers from a spathe; perianth corolla-like. Stamens 3 or 6, mostly unequal or dissimilar. Capsule 1-celled or imperfectly 3-celled.

118. **Xyridaceæ** (p. 536). Rush-like, scapose. Flowers capitate, perfect, 3-androus, the calyx glumaceous. Capsule 1-celled.

119. **Mayaceæ** (p. 537). Moss-like aquatic. Flowers perfect, axillary, solitary, 3-androus; calyx herbaceous. Capsule 1-celled.

120. **Commelinaceæ** (p. 538). Flowers perfect, regular or somewhat irregular, with 3 more or less herbaceous persistent sepals and 3 fugacious petals. Stamens 6 or some sterile. Capsule 2–3-celled.

127. **Eriocauleæ** (p. 566). Scapose aquatic or marsh plants, with linear leaves and dense heads of moncœcious (rarely dicœcious) minute flowers. Corolla tubular or none. Capsule 2–3-celled, 2–3-seeded.

+– 2. Perianth small, of 6 equal persistent glumaceous segments; flowers perfect; ovary compound.

121. **Juncaceæ** (p. 539). Rush-like. Stamens 3 or 6. Capsule 1- or 3-celled, 3-valved.

+– 3. Flowers without chaffy glumes, the perianth none or reduced to bristles or sepal-like scales; flowers often moncœcious or dicœcious; carpels solitary or united.

++ Flowers capitate or upon a spike or spadix, with or without a spathe.

122. **Typhaceæ** (p. 547). Marsh or aquatic plants, with linear leaves, and moncœcious flowers without proper perianth, in heads or a naked spike.

123. **Araceæ** (p. 548). Flowers perfect or moncœcious upon the same spadix, rarely dicœcious, with 4 or 6 scale-like sepals or none.

++ ++ Flowers very minute, one or few from the margin of a floating disk-like frond.

124. **Lemnaceæ** (p. 551). Plants very small, green, mostly lenticular or globose.

+– 4. Perianth of 4 or 6 segments, the inner often petaloid, or none; carpels solitary or distinct (coherent in Triglochin); seeds without albumen; aquatic or marsh plants, often moncœcious or dicœcious.

125. **Alismaceæ** (p. 553). Perianth of 6 segments, the inner petal-like.

126. **Naiadaceæ** (p. 557). Perianth-segments herbaceous or none.

+– 5. Flowers in the axils of chaffy scales or glumes arranged in spikes or spikelets, without evident perianth; stamens 1–3; ovary 1-celled, 1-seeded; seed albuminous.

128. **Cyperaceæ** (p. 567). Scales single. Perianth none or replaced by bristles. Anthers basifixed. Fruit a triangular or lenticular achene. Stem solid, often triangular, with closed sheaths.

129. **Gramineæ** (p. 623). Glumes in pairs. Perianth replaced by minute scales. Anthers versatile. Fruit a caryopsis. Culm usually hollow, terete; sheaths split to the base.

Series II. CRYPTOGAMOUS or FLOWERLESS PLANTS;

destitute of stamens and pistils, in fructification producing *spores* instead of seeds.

Class III. ACROGENOUS PLANTS.

Cryptogamous plants with a distinct axis (stem and branches), growing from the apex only, and furnished for the most part with distinct leaves (sometimes taking the form of an expanded leaf-like usually prostrate *thallus*); reproduction by means of antheridia and archegonia, sometimes also by gemmation.

Subclass I. VASCULAR ACROGENS, or PTERIDOPHYTES.

Stems (and foliage when present) containing both woody fibre and vessels; antheridia or archegonia, or both, borne on a minute prothallus, which is developed from the spore on germination.

* Spores of only one kind; prothallus bearing antheridia and archegonia.

130. **Equisetaceæ** (p. 675). Cylindric jointed hollow-stemmed plants, with toothed sheaths. Fructification in a terminal spike.

131. **Filices** (p. 678). Ferns, with fronds circinate in vernation, bearing the fructification on the under surface or beneath the margin.

132. **Ophioglossaceæ** (p. 693). Fronds often fern-like, erect in vernation. Sporangia globose, coriaceous, 2-valved, in special spikes or panicles.

133. **Lycopodiaceæ** (p. 695). Low moss-like plants with elongated stems and small persistent entire several-ranked leaves. Sporangia solitary, axillary, 1–3-celled, 2–3-valved.

* * Spores of two kinds, the *macrospore* producing a prothallus with archegonia, the *microspore* smaller and developing antheridia.

134. **Selaginellaceæ** (p. 697). Low leafy moss-like or marsh plants, with branching stems, and small 4–6-ranked leaves, or with a corm-like stem and basal linear-subulate leaves, the two kinds of spores in distinct solitary axillary 1-celled sporangia.

135. **Marsiliaceæ** (p. 700). The two kinds of spores in the same or different sporangia which are borne in a coriaceous peduncled sporocarp arising from a slender creeping rhizome. Fronds digitately 4-foliolate or filiform.

136. **Salviniaceæ** (p. 701). The two kinds of spores in separate thin-walled 1-celled sporocarps or conceptacles clustered beneath the small floating fronds; macrospores solitary.

SUBCLASS II. CELLULAR ACROGENS, OR BRYOPHYTES. Plants with cellular tissue only; both antheridia and archegonia borne upon the plant itself. — Including the MUSCI, or Mosses (which are not treated of here), never thallose, and bearing capsules which usually dehisce by a lid and contain spores only, and the HEPATICÆ, which bear capsules which dehisce by valves or irregularly and usually have elaters mingled with the spores. The latter division comprises the following Orders.

* Capsule 4-valved; plant a leafy axis or sometimes a branching thallus.

137. **Jungermanniaceæ** (p. 702). Leaves, when present, without a midrib, 2-ranked, with often a third row beneath; pedicels slender.

* * Capsule 2-valved, or dehiscing irregularly, or indehiscent; plant a thallus or thalloid stem.

138. **Anthocerotaceæ** (p. 726). Thallus without epidermis, irregularly branching; pedicels stout or none. Capsule with a columella. Elaters mostly without fibres.

139. **Marchantiaceæ** (p. 727). Thallus radiate or dichotomous, the epidermis usually porose. Capsules borne on the under side of a pedunculate receptacle, irregularly dehiscent. Elaters 2-spiral.

140. **Ricciaceæ** (p. 730). Thallus radiate or dichotomous, the epidermis eporose. Capsules immersed in the thallus or sessile upon it, indehiscent. Elaters none.

ANALYTICAL KEY TO THE ORDERS.

CLASS I. DICOTYLEDONOUS PLANTS. (See p. 5.)

SUBCLASS I. ANGIOSPERMÆ. Pistil consisting of a closed ovary. Cotyledons only two.

DIVISION I. POLYPETALOUS: the calyx and corolla both present; the latter of *separate* petals.

A. *Stamens numerous, at least more than* 10, *and more than twice the sepals or lobes of the calyx.*

1. *Calyx entirely free and separate from the pistil or pistils.*

	PAGE
Pistils numerous but cohering over each other in a solid mass on an elongated receptacle.	MAGNOLIACEÆ, 49
Pistils numerous, separate, but concealed in a hollow receptacle.	
Leaves opposite, entire; no stipules.	CALYCANTHACEÆ, 167
Leaves alternate, with stipules.	Rosa, in ROSACEÆ, 162
Pistils several, immersed in hollows of the upper surface of a large top-shaped receptacle.	Nelumbo, in NYMPHÆACEÆ, 55
Pistils more than one, separate, not enclosed in the receptacle.	
Stamens inserted on the calyx, distinct.	ROSACEÆ, 150
Stamens united with the base of the petals, monadelphous.	MALVACEÆ, 96
Stamens inserted on the receptacle.	
Filaments much shorter than the anther; trees.	ANONACEÆ, 50
Filaments longer than the anther.	
Flowers dicœcious; twiners with alternate leaves.	MENISPERMACEÆ, 51
Flowers perfect; if climbers, the leaves opposite.	
Leaves not peltate; petals deciduous.	RANUNCULACEÆ, 34
Leaves peltate; petals persistent.	Brasenia, in NYMPHÆACEÆ, 55
Pistils several-lobed, the ovaries united below the middle.	RESEDACEÆ, 75
Pistils several, their ovaries cohering in a ring around an axis.	MALVACEÆ, 96
Pistils strictly one as to the ovary; the styles or stigmas may be several.	
Leaves punctate under a lens with transparent dots.	HYPERICACEÆ, 92
Leaves not punctate with transparent dots.	
Ovary simple, 1-celled, 2-ovuled.	ROSACEÆ, 156
Ovary simple, 1-celled, with one parietal many-ovuled placenta.	
Leaves 2–3-ternately compound or dissected.	RANUNCULACEÆ, 34
Leaves peltate, simply lobed.	Podophyllum, in BERBERIDACEÆ, 52
Ovary compound, 1-celled, with a central placenta.	PORTULACACEÆ, 90