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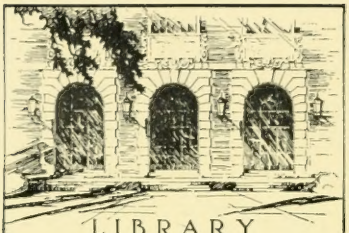

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ILLUSTRATIONS

OF THE

NATURAL ORDERS OF PLANTS

WITH

GROUPS AND DESCRIPTIONS

BY

ELIZABETH TWINING.

REDUCED FROM THE ORIGINAL FOLIO EDITION.

160 colored plates

VOL. I.

LONDON:
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INTRODUCTION.

Of all the varied objects of creation there is, probably, no portion that affords so much gratification and delight to mankind as plants. Combining so many various qualities of utility and beauty, and being as they are so widely spread abroad in the world,—over the plains, the valleys, and the mountains; in the depths of the earth, and in the waters of the ocean, the lakes, and the rivers, and every pond and pool; in the hottest regions of the tropics, and extending even to the frozen lands of the Arctic zone, they claim attention everywhere, and in all times, in a pre-eminent degree. From the earliest years of childhood, when the simple and abundant daisy yields one of the most valued recreations, until the close of life, when flowers are planted on the grave, there is no period when some of the countless variety of plants do not minister in some way to our comfort and enjoyment. There is high and ancient authority for the study of plants. We read that he to whom was given "wisdom and understanding exceeding much, and largeness of heart," whose "wisdom excelled the wisdom of all the children of the east country, and all the wisdom of Egypt,"—he spake of trees, from "the cedar-tree that is in Lebanon, even unto the hyssop that springeth out of the wall." It is interesting to think of this branch of knowledge as of one which contributed to spread the fame of Solomon "in all nations round about," so that "there came of all people to hear his wisdom."

There are, indeed, numerous proofs of the value of a knowledge of plants in all ages of the world. It is now 250 years since the good old Gerard completed his famous "Herbal" in this country, and declared he could find no greater delight than to behold the earth apparelled with plants,—a delight great to the outer senses, but greater still to

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the mind enriched with the knowledge of these visible things, "setting forth to us the invisible and admirable workmanship of Almighty God." Many works have already been prepared to aid in understanding the nature of plants,—to explain their wonderful arrangement in every part, to mark their manner of growth, to ascertain their various properties, or to recall their beautiful forms when faded and gone during the decay of winter. But it is hoped these illustrations, combined with descriptions, in simple, and as far as possible untechnical language, may add something to the enjoyment to be derived from plants. If they can increase gratification to those who possess beautiful gardens, or delight in searching out the native plants of our fields and roads; or if they should be able to awaken in any mind an interest in the study of the nature and properties of plants, my design will be fulfilled, and a humble, but very earnest desire accomplished.

The groups are intended to show in one view some of the principal plants composing the respective tribes, arranged as modern science has found to be in accordance with structure and properties. The system of De Candolle is that followed, with only slight exceptions. In every Order that contains British plants English species are selected as examples, but combined with others from foreign countries. By thus placing our native plants in groups with foreigners, we acquire a more correct idea of the nature of our Flora, and the character it has when compared with that of other countries. This is the first work which has thus done due honour to our British plants by connecting with others, and placing them whenever possible at the head of the Order to be illustrated. The new method of classing plants into Orders, according to the structure of the parts of fructification, is thought to be more difficult to the student than the old system of Linnæus; but having groups brought before us, united with descriptions, renders the subject easy and agreeable. One very interesting point is thus gained,—that is, a ready perception of the geographical distribution of any particular tribe. Also, what proportion our British Flora bears, both in quantity and quality, to the whole range of the Natural Orders: how we have some tribes in their full vigour and abundance; of others, only a few species, scattered, as it were, on the geographical limits of the tribe. Of others, no specimen will be found in our temperate clime; for some of the groups will be seen to belong exclusively to the tropics, and some to the cooler regions. By thus connecting our own Flora with a general view of the Orders to which the plants we possess belong, a higher interest may be given to the

examination of many lowly flowers of our fields. The common buttercup may be considered as a perfect type of that numerous tribe "Ranunculaceæ," named from the genus, and abounding chiefly in the northern countries of Europe. The study of Euphorbiaceæ, the Spurge tribe, in this country, will show either small herbaceous weeds in gardens, or a few other species, of rather larger size, but not more pleasing aspect, in woods and hedges; but, on examination, one chief character of the Order will be observed, namely, an abundant milky juice of extreme acridity. The very curious arrangement of the parts of the flower may be perceived, also, as well in these as in the larger species which grow in tropical America, or on the mountains of Northern India, or at the base of the Peak of Teneriffe; some of which attain a gigantic size, rising in upright, angular columns, or with variously branched stems, beset with strong spines. These have, indeed, a very different aspect from that of our small weeds of this tribe, but the essential characters are the same. Among those tribes of which we have the finest specimens in the British isles may be noticed the oak, elm, ash, and willow-trees: these all attain a vigorous growth in the temperate climate of this country. The oaks of England are not surpassed in any other part of the world. The ash of the Isle of Wight rivals that of North America. Of some tribes we possess only a few species, which are beyond the boundaries of the chief mass of the group,—as in the Mallow tribe, which belongs principally to the tropics, extending a few small species into our temperate region. In other tribes, we have one genus in Britain, a few more in France or Germany, and discover the main centre of the group in some other part of the Continent. This occurs in Cistaceæ; Helianthemum is the only British example. Cistus is found in Germany and Switzerland, and the chief mass of the tribe is in Spain and Portugal. There are many tribes of which we possess only small herbs, but when we follow them out into hotter countries we often perceive shrubs or large trees belonging to the tribe. Perhaps the same genus may be expanded into shrubby species in warmer regions. The English species of flax are all small herbs; in the East Indies one is an evergreen shrub. Of the Umbelliferous tribe we have numerous herbs only; Bupleurum *tenuissimum* the smallest. In the south of France Bupleurum *fruticosum* is an evergreen shrub, five or six feet high; Bupleurum *canescens* on the coast of Barbary is a hoary evergreen of still larger growth. Of the extensive tribe of composite plants forty-five genera are found in Britain, many of them very plentifully, as the Daisy, Thistle and others; but all

herbaceous, and nearly all of low growth. The great Scotch Thistle, one of the finest of the tribe, is seldom more than five or six feet in height. Some, however, of the British genera may be found existing in other countries, and there developed in very different specific forms, as shrubs or trees. Sonchus, of very tender, succulent nature here, affording food for rabbits, is known in Madeira and the Canaries in the form of evergreen shrubs. Some of the largest trees of St. Helena belong to this composite tribe. Among the various native species we have of the vast Leguminous tribe, only Ulex, the Furze, and Spartium, the Broom, are of a shrubby nature. Proceeding towards the south of France, we meet with the Laburnum, and other trees of considerable size. Advancing still further into tropical regions, this important tribe is found in shrubs and lofty trees, of varied utility and beauty. Amherstia *nobilis*, of the East Indies, is a large tree bearing magnificent drooping branches of scarlet flowers, said to be unsurpassed in the vegetable world. The Hymenea of Brazil has been found to measure eighty-five feet around the base of the stem; it is said to live to 2000 years. Of the grass tribe, we have lowly specimens only: our native species incline more to the northern than the southern types. Poa, our meadow grass, stretches to the icy regions of Spitzbergen and Melville Island. Other of our grasses are found also to the south; and these frequently in lofty situations, as on the Alps, near the limits of perpetual snow; on the Andes, and on the Himalayas. Arundo *Phragmites*, is the common reed, our largest species of this tribe; in the deep ditches about the mouth of the Thames, it gives an idea of the more gigantic grasses of the South. Arundo *Donax*, of North Africa, advances into the South of Europe, and gives a clear indication of the more highly developed tropical species. But there is one striking character of this tribe which we perceive as distinctly in this country as anywhere: the peculiar property of spreading over wide spaces of ground with scarcely any intermixture of other plants, can nowhere be better observed than in our meadows and lawns. In the Tropics, large grasses grow separately, like other plants, are of greater size and height, and in some instances have wider leaves than any of the species belonging to the temperate zone, and assume partly the appearance of trees.

In examining other tribes, we find the same genera or species widely spread in distant countries, and retaining the same form and appearance, but growing in different situations, where there may be a climate favourable for their growth. Vaccinium *Myrtillus*, the Bilberry, is a low shrubby plant, spreading over a wild ground; it abounds in various parts

of Britain, either on heaths, or on rocks of no great elevation, as those of Tunbridge Wells; or on a turfy soil in the northern counties of England, and the moors of the Scotch Highlands. In Switzerland it is not confined to low rocks or moors; it is also to be found on the turfy heights of the Alps; on the higher part of the Simplon Pass it covers the ground on all sides, and in autumn gives a bright colouring to the scene by its red leaves.

In the Saxifrage tribe, there is very little diversity of form or situation. It is extensively scattered over all Northern countries, merely varied in position according to the climate. For example: Saxifraga *oppositifolia*, which is abundant on the highest hills of Wales, Yorkshire, or Scotland, is found also in Switzerland, Germany, and France; but in those countries, in still loftier localities than those of Britain. It may be seen on the northern slopes of the Pyrenees, on the mountains of Moravia and Bohemia, and on the Grimsel, Ghemmi, Righi, St. Gothard, and other Alps, at an elevation sometimes approaching the limit of perpetual snow. This little plant is also to be traced as far north as Melville Island, in 75° of N. lat. There it finds a sufficiently cold temperature on the level plain, the dreary monotony of which it enlivens with its bright purple flowers, on the earliest arrival of spring. The budding of this small Saxifrage was one of the welcome indications of spring that gladdened the hearts of Captain Parry and his crew, after their ice-bound winter in the Polar regions.

The Juniper of our northern moors is another plant that is widely dispersed, and consequently inhabits very dissimilar localities. If we follow it northwards, we shall find its low stunted form on the level plains of Lapland, which are during a great portion of the year covered with snow. If we search for it in hot countries, it will be found only on mountains, as on the western slope of the Himalayas, at 14,500 feet.

There are, however, a few minute plants among the lower tribes, which are not only entirely of the herbaceous class, but which, in whatever part of the world we discover them, inhabit similar situations, floating always in still waters. Callitriche *verna*, the Water Star-wort, so plentiful in the ditches and ponds of England, has also been observed in Lord Auckland's Isle, in 65° of S. lat., and in the Azores, in 38° of N. lat. In Iceland, in 65° of N. lat., our Callitriche *autumnalis* covers the ponds and ditches. In these humble plants, we not unfrequently find a greater power of adaptation to various climates and stations, and a more extensive dispersion over the globe, than in the higher tribes. It is remarkable what varied forms vegetation assumes, and in what strange situations it is found.

Deep in the coal-mines of Saxony, far from the light of day, grows the Rhizomorpha *subterranea*, a small branching plant, on the limits of the Fungus tribe, which possesses phosphorescent properties, and shines in the dark with great brilliancy. Racodium *cellare* is a very singular substance of the Fungus kind, that occasionally grows in cellars, filling every space with its hanging masses of black fibres. Rocks which appear at a distance to be bare, are often perceived on closer examination to be clothed with a thin covering of flat Lichens, of various kinds, some of which adhere so firmly as to be inseparable from it. Some of the Confervæ have been found growing in boiling springs in Arabia, at the Cape of Good Hope, and in the Geysers of Iceland. Marchantia and Lycopodium were seen close to hot springs in the Island of Amsterdam, in the Indian Ocean. Several of these lowest tribes of plants are also capable of enduring extreme cold. The Reindeer Lichen covers extensive plains in Lapland, where it is buried under thick snows for many months without injury. Protococcus *nivalis*, a minute plant on the verge of vegetable life, was first noticed by Saussure, on the perpetual snow of the Alps, tinging the surface with a red hue: it consists of simple cells filled with a red fluid, and has obtained the name of Red Snow, from its appearance, which at first caused great perplexity. It excited also much surprise to Captain Ross and his crew during their expedition to the Polar regions, where it was discovered reddening vast plains of snow and ice.

Various kinds of Algæ, or Sea-weeds, pervade both salt and fresh water in every possible situation. Some are so exceedingly minute as to be scarcely perceptible to the naked eye; others far exceed in length of stem any land plant. Macrocystis *pyrifera* is a tropical genus, inhabiting the Indian Ocean: the slender stems are said to reach the enormous length of 1500 feet. The Sargassum, or Gulf-weed, which Columbus met with, like a floating meadow on the Atlantic Ocean, is often seen in large masses, extending from 25° to 36° of N. lat. Some species flourish in shallow water, others in deep seas. Fucus *vitifolius* was brought up from a depth of 190 feet, off the Coast of the Canaries, by Humboldt and Bonpland, and exhibited the peculiar property which sea-weeds possess of acquiring green colour without the aid of light.

Truly "the earth is full of riches; so is the great and wide sea also!" Not only does the land bring forth abundantly every green herb and tree after its kind, but the waters are also full of suitable vegetation, affording food and shelter to the "things creeping innumerable" that dwell therein. It is remarkable that among those plants considered useless, are to be

found the most striking examples of beautiful form, brilliant colour, and fragrant scent, as is particularly the case in the Lily and the Orchis tribes, as if thus to remind us that they also are not to be disregarded; that they are to be observed for some good and wise purpose; that we may admire them for their excellent beauty, and examine their wonderful structure, and perceive, thus more clearly, the omnipotence and the mercy of the Creator, who knoweth whereof we are made, who seeth that our path is beset with many thorns, and that our spirits, as well as our bodies, are liable to weariness, and need refreshment and cheering as we pass on our pilgrimage. Even the so-called useless plants may have their allotted service to man; and though not offering any material uses, may be made available for other and higher purposes. They can perform a share of the great work of enlightening the mind, and refining the taste, and purifying the heart for true and simple enjoyment. They are no invention of fallible man, who, even in his best plans for gratification or recreation, often fails of the intended end; they are the gifts of our heavenly Father, accessible to all His children. The joyous can go gladly forth on their sunny path in the bright garden; the weariest and weakest may rest on their way on the green herb and the lowly flowers; and the busiest even in the crowded city may derive cheering delight from the humble window-garden, and will readily pause on their course to "consider the lilies how they grow."

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70. Umbellaceæ..... Carum *carui*. Pastinaca *sativa*. Crithmum *maritimum*. Hydrocotyle *vulgaris*. Leucolena *rotundifolia*. Astrantia *maxima*. Prangos *pabularia*. Scandix *Pecten-Veneris*. Daucus *Carota*.

71. Araliaceæ ..... Aralia *hispida*. Panax *pseudo-ginseng*. Hedera *Helix*. Adoxa *moschatellina*.

72. Caprifoliaceæ ... Caprifolium *Periclymenum*. Viburnum *Opulus*. Linnæa *borealis*. Abelia *floribunda*. Symphoria *racemosa*. Weigela *rosea*. Benthamia *fragifera*. Sambucus *nigra*.

73. Loranthaceæ ... Loranthus *Evenius*. Loranthus *formosus*. Viscum *album*. Loranthus *pentrandus*. Loranthus *chrysanthus*.

74. Rubiaceæ ..... Rubia *peregrina*. Asperula *odorata*. Coffea *arabica*. Mussœnda *macrophylla*. Ixora *coccinea*. Coccocypselum *Tontarea*. Galium.

75. Valerianaceæ ... Valeriana *dioica*. Fedia *olitoria*. Centranthus *ruber*. Nardostachys *Jatamansi*.

76. Compositaceæ ... Bellis *perennis*. Agathea *celestis*. Carthamus *tinctorius*. Scorzonera *hispanica*. Catananche *cerulea*. Cosmea *bipinnata*. Zinnia *elegans*. Centaurea *cyanus*. Elichrysum *spectabile*. Calliopsis *bicolor*. Echinops.

77. Dipsaceæ ..... Dipsacus *sylvestris*. Scabiosa *succisa*. Knautia *arvensis*. Scabiosa *atro-purpurea*. Scabiosa *ochroleuca*. Scabiosa *columbaria*.

78. Stylidiaceæ ..... Stylidium *glandulosum*. Forstera *clavigera*. Stylidium *laricifolium*. Stylidium *calcaratum*.

79. Goodeniaceæ ... Goodenia *grandiflora*. Scævola *microcarpa*. Brunonia *australis*. Lechenaultia *formosa*. Goodenia *ovata*.

80. Campanulaceæ ... Campanula *rotundifolia*. Campanula *garganica*. Roella *ciliata*. Michauxia *campanuloides*. Canarina *campanula*. Campanula *bononiensis*. Campanula *medium*.

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RANUNCULACEÆ.

THE CROWFOOT TRIBE.

This Order consists of herbs and shrubs, the climbing species of Clematis being almost the only instance of a woody stem. The leaves grow either opposite or alternate on the stem; they are generally much divided. The leaf-stalks form a kind of sheath partly enclosing the stem. The flowers vary much in form, but in essential parts a great similarity prevails throughout the Order. The petals usually five, one having sometimes a horned spur or nectary, as in Delphinium. The number of the petals varies from 3 to 15. The parts of the calyx also vary, and are sometimes coloured and form the actual flower, as in Hellebore. The stamens are many, placed below the ovary, which is composed of many seed-vessels of one cell each, or combined into one vessel containing many cells. The seed-vessel, when ripe, is either a cluster of several dry cells, as in Ranunculus, or a berry, with one or more seeds, as in Actea; or a pouch, with one or more valves, as in Larkspur. The seed has sometimes a feathered end, as in Anemone or Clematis.

Allied in some points with the Magnolia, and the Poppy tribe.

Acrid and even poisonous properties prevail in these plants.

Several of the most common and favourite flowers of our fields belong to this tribe. Ranunculus *acris* (1), the buttercup, has a brilliant golden flower, but the whole plant is acrid. R. *Thora*, of Germany, is said to have yielded the juice formerly used by hunters to poison their javelins when pursuing wild animals. Ficaria is one of the first plants to appear in spring, adorning a hedge-bank with its glossy leaves and bright star-like flowers. R. *aquatilis*, the white crowfoot, is frequent in ponds or streams; its leaves rounded above the water, divided into fine segments below. R. *bulbosus*, of England, grows also on the Himalayas. R. *asiaticus* affords the numerous varieties of double flowers cultivated in Holland for our gardens. The black berries of Actea *spicata*, the baneberry of Yorkshire and Scotland, are poisonous, although the roots are used medicinally. Aconite and other species yield medicine in India, and in North America. Hellebore (2) was known and used in ancient times. Many of our early garden flowers belong to this

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1. Ranunculus *acris*, *Buttercup*. England.
   1A *Petal with the nectary.*
2. Helleborus *fœtidus*, *Bearsfoot Hellebore*. England.
3. Anemone *coronaria*, *Poppy anemone*. Levant.
4. Anemone *japonica*. China and Japan.
5. Delphinium *elatum*, *Bee Larkspur*. Siberia.
6. Trollius *europæus*, *Globe flower*. England.
7. Clematis *viticella*, *Virgin's bower*. Spain.
   7A *Seed of* Clematis *vitalba*, *Travellers' joy*. *Hedges*, England.

tribe. The delicate Hepatica, with its triple leaf. The Christmas Rose, or white Hellebore. The Chinese Peony : and the Chinese Anemone (4), lately brought from China, where it is planted on graves. Larkspur and Aconite also produce several beautiful varieties, flowering abundantly. The wood Anemone abounds in sheltered copses in spring. Anemone *pulsatilla* is seen on chalk downs and pastures in many parts of England, bearing soft purple flowers in April and May. Caltha *palustris*, Marsh Marigold, is one of the gay yellow flowers used formerly to adorn a may-pole.

All this tribe requires a cool climate, and is widely dispersed in all suitable places; in the tropics on mountains. The greatest portion of these plants are in Europe. North America has many. R. *acris* and others grow in Iceland and Lapland; Trollius *europæus* in Norway. One species was found in Melville Island, 75° N. Lat. About 100 species belong to the Himalayas, R. *bulbosus* of England amongst them, but more hairy. A beautiful white Clematis climbs over trees in New Zealand.

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DILLENIACEÆ.

THE DILLENIA TRIBE.

Trees, shrubs, and under-shrubs, with a very few herbaceous plants. The leaves usually grow alternate on the stem, very seldom opposite to each other, almost always without stipules; of a thick leathery substance, and generally having veins passing straight from the mid-rib to the margin in the manner called feather-veined. The flowers have five petals and five sepals; the stamens are attached below the ovary; either distinct, or united in sets. In Dillenia *scabrella* (1) the stamens of the inner row are longer and bend over those of the outer row; sometimes they are placed on one side of the pistil instead of around it. The ovaries are terminated by a simple stigma; the fruit is composed of two or five carpels, distinct, or cohering together, the seeds are surrounded by a pulpy aril, and are fixed in a double row to the inner edge of the carpel. The sepals remain after the petals fall off, and become a thickened covering to the fruit.

These plants have much affinity with Magnoliaceæ, also with Ranunculaceæ, but differ from both by the want of stipules, the persistent calyx, and the quinary arrangement of the parts of fructification. Their most distinguishing character is the aril round the seeds.

The chief use of this tribe is derived from the astringent property.

Dillenia *scabrella* (1) is a tree thirty or forty feet high, with numerous branches. The flowers come forth in the beginning of the year before the leaves, and are very fragrant; the fruit ripens in May. The fleshy ripe calyx is used in Bengal to give a pleasant acid flavour to curries. This and other species of Dillenia yield a valuable, hard, and durable timber. The juice of the fruit of Dillenia *speciosa*, when mixed with syrup, is considered a remedy for coughs in India. Many of the Indian trees of this tribe are remarkable for the grandeur of their form and the beauty of their flowers. Dillenia, Tetracera, and others, have an exceeding rough surface to their leaves, which makes them useful to the natives for polishing wood and even metal. Hibbertia *volubilis* (3) is a lofty tree in Malabar, the flowers are of a brilliant appearance, but have an unpleasant odour. Several species of Tetracera are employed medicinally by the Brazilians. Curatella *Sambaiba* is powerfully astringent, and affords an excellent decoction for healing wounds, and also is much used by tanners in Brazil.

The larger portion of this tribe is found to inhabit India, Australia, and the equinoctial parts of America. Only a very small number grow in equinoctial Africa.

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1. Dillenia *scabrella*. Bengal.
2. Candollea *cuneiformis*. New Holland.
3. Hibbertia *volubilis*. Malabar and Java.
4. Hibbertia *pedunculata*. New South Wales.
   4A *Seed-vessels.*

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MAGNOLIACEÆ.

THE MAGNOLIA TRIBE.

This Order is composed entirely of trees or shrubs, no herbaceous plants. The leaves are generally of a thick, leathery substance, grow alternately, and are jointed on the stem. The rolled-up stipules, which grow around the base of the leaf-buds, soon fall off, their place being marked by an annular scar on the branch. The calyx has either three or six sepals, which drop off when the flower expands. The petals are three or more, in several rows. Stamens numerous, with long anthers on the filaments, placed below the pistil, which is composed of many short styles and simple stigmas. Fruit either dry or succulent, containing several seed-vessels, which are either entire or gaping, distinct or partially connected, often collected in a long-shaped cone. In a few plants the seed-vessels are circular, in the form of a star, as in Illicium, Tasmannia, and others.

The general character of these plants is to have fragrant flowers, and bitter aromatic properties; none can be said to bear eatable fruits, although that of Illicium *anisatum* has a pleasant aromatic flavour: other species yield an useful oil from the fruit. Kalm ascertained the presence of these trees by their odoriferous scent at a distance of three miles, when the wind was favourable. Magnolia was so named after Pierre Magnol, a celebrated botanist of Montpelier. Magnolia *grandiflora* (1) is one of the noblest of evergreen trees, with splendid foliage, and large, highly-odorous flowers. Liriodendron *tulipifera* (3) is a lofty tree in the forests of North America, and is now become naturalized in European gardens, being much esteemed for its singular form of leaf, and elegant tulip-like flowers. In the south of France, and in Italy, it is frequently planted in public walks and avenues; the wood is used in America for canoes. Talauma (2) is a genus, so called by the natives of South America; it consists of magnificent trees and shrubs, resembling Magnolias in many respects, and belongs also to Java and the Antilles. Magnolia *pumila* is well known in our greenhouses for the extreme fragrance of its small, brownish flowers; Magnolia *conspicua* grows in Japan and China, and is admired here for its large white flowers, which appear before the leaves, on the grey branches. Some species of this genus in the United States yield an aromatic infusion from the green cones, which is useful in medicine. Magnolia *glauca* is the swamp sassafras, or beaver-tree, of North America; the bark rivals that of

1. Magnolia *grandiflora*, *Laurel-leaved Magnolia*. Carolina.
   1A *Stamens.*
2. Talauma *Candollii*. Java.
3. Liriodendron *tulipifera*, *Tulip-tree*. North America.
   3A *Stamens.*
   3B *Pistil.*
4. Illicium *anisatum*, *Star-anise*. China.
   4A *Seed-vessel.*

Cinchona in bitter, aromatic properties. Aromadendron *elegans*, of Java, bears fruit in a round cone; it is remarkable for the fragrance of its blossoms and aromatic, bitter bark: its timber is also valuable in that country. Michelia is known in several species in Java. Michelia *Doltsopa* is one of the finest trees in Nepal, yielding an excellent, fragrant wood, much used there for building houses. Michelia *champaca* has sweet-scented, orange-coloured flowers, which the natives of India form into garlands for the head, and employ in their religious ceremonies. Drymis *Winteri*, a native of Magellan, yields the celebrated Winter's bark, which was found so beneficial a restorative to the crew of Captain Winter's ship, who accompanied the circumnavigator Drake; the aromatic leaves and bark are said to be useful condiments in the cold climate of Magellan Straits. In Brazil the aromatic bark of Drymis *granatensis* is much esteemed as a spice and a tonic, and Drymis *axillaris* of New Zealand has equally useful properties. Illicium *anisatum* (4) has the same powerful aromatic quality, and is used by the Chinese as a spice in their food; the fruit yields an useful oil. Illicium *religiosum* is considered a sacred plant by the Japanese, who place garlands and branches of it before their idols, and on the graves of their departed friends; the fragrant seeds are burnt as incense in their temples. Tasmania *aromatica* yields a fruit that is occasionally used as pepper by the settlers in Tasmania.

The chief centre of this tribe is doubtless North America, where the woods, the swamps, and the sides of the hills abound with various species; thence they extend to Asia. The seven species of Michelia in Nepal form a link between the floras of North America, China, and Japan. No species have yet been found on the continent of Africa, or in any of the adjoining islands, and none belong to Europe.

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ANONACEÆ.

THE CUSTARD-APPLE TRIBE.

Trees and shrubs, with simple leaves growing alternate on the stem, without stipules. The flowers are usually of a pale-green colour, or brown, growing from the base of the leaf-stalk, solitary, or two or three together. The calyx is composed of three sepals, in most cases partly cohering together. The petals are very rarely wanting. The stamens are of indefinite number, placed closely together, having short angular filaments, and anthers sometimes bearing honey at their angular base. The styles are short, and the stigmas simple. The fruit is composed of many carpels, which are either succulent or dry, sessile or stalked, united in a fleshy mass, as in Anona, or separate, as in Guatteria.

Bocagea forms a link between this Order and Berberidaceæ.

Powerful aromatic properties prevail throughout these plants. Anona *squamosa* (1) is the common custard-apple of the West Indies; its agreeable and succulent fruit is the daily food of the natives; but it is an acquired taste to Europeans to relish their peculiar flavour. The leaves have a disagreeable odour, and the seeds contain a highly acrid juice, fatal to insects. Anona *cherimolia* (the famous Cherimoyer of Peru) is said to be one of the most delicious of fruits. Anona *muricata*, the Soursop, is very abundant in Jamaica; the flavour of the fruit resembling that of the European black currant. Several species of Guatteria (2) are common in Java; the fruit of these, as also of Polyalthia, passes through various changes of colouring during the process of ripening. Polyalthia *subcordata* has white flowers, much like those of the orange in appearance. The bunches of red and purple fruit of the size of currants, and the long leaves of a grey hue on the under-surface, combine to render it a very beautiful tree. Some species of Uvaria have a green hairy fruit; that of Uvaria *febrifuga* affords a medicine in South America; the bark of Uvaria *tripetaloidea* yields a fragrant gum. Xylopia *aromatica* is known by the name of Ethiopian pepper, and is eaten by negroes in Africa. Xylopia *glabra* is of extreme bitterness in every part of the plant. Xylopia *sericea* is a large tree in the forest of Rio Janeiro; it bears an aromatic fruit, used sometimes instead of pepper; cordage is prepared from the fibrous bark. The flowers of Artabotrys *odoratissima* are extremely sweet-scented; the fruit grows in clusters, and is of the size of a

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1. Anona *squamosa*, *Custard-apple, or Sweet-sop.* South America.
   1A *Section of a Seed.*
2. Guatteria *lateriflora*. Java.
   2A *Flower, cut open.*
2. Guatteria *lateriflora* (*continued*).
   2B *Stamen.*
   2C *Pistil, magnified.*
   2D *Seed.*
   2E *Fruit, cut open.*

walnut: the leaves are used in medicine. Almost every part of these plants is of utility to the natives of the countries where they grow, particularly in Brazil. Duquetia *quitarensis* of Guinea is the lancewood used by coachmakers for the shafts of light carriages, for which purpose it is excellent.

This order is dispersed throughout the tropical region of the world; a few of the plants extend beyond them; some have been naturalised in remote stations by cultivation in colonies, especially the Custard-apples and Cherimoyer. Three species of Anona have now become general in India. Guatteria, Uvaria, and Artabotrys, also grow there; a few species are scattered as far as 45° of North latitude on the hills about Monghir, on the Ganges, in Hindostan.

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MENISPERMACEÆ:

THE MOON-SEED TRIBE.

This Order consists of shrubs and perennial herbs, of a flexible, tough nature, and climbing habit; the wood is frequently without concentric zones. The leaves are alternate, usually simple and entire, sometimes peltate or buckler-shaped, in some instances compound, destitute of stipules. The flowers are small, usually on slender branching stalks, having stamens and pistils on separate plants; the sepals and petals of the stamen flowers are nearly alike in appearance, placed in rows of three or four, seldom five, falling off soon. The stamens are united in a set, or occasionally distinct, sometimes opposite the petals, and equal to them in number, sometimes three or four times as many; the anthers are turned outwards, fixed either along the edge of the filament or at its point. The pistil-bearing flower has occasionally only one sepal and one petal on one side of the pistil. The style is simple or trifid. The seed-vessel is usually an oblique or moon-shaped berry, compressed, bearing one seed, usually attaining the same crescent form; the albumen, when present, is thin and fleshy, or horny.

Allied with Kadsura in the Custard-apple tribe; the yellow wood and bark and the bitter taste connect it with the Berberry.

Active narcotic and bitter qualities prevail among these plants: the narcotic principle is in some species so abundant as to render them poisonous; the bitter properties of some cause them to be valuable as tonic medicine: a few species are mucilaginous.

Menispermum, Moon-seed, was named from the Greek, in allusion to the crescent form of the seed-vessel. Menispermum *canadense* (1) is a climbing plant of graceful growth, but of dull foliage, and having small inconspicuous flowers; it is hardy in the English climate, and grows readily with support. Cocculus *Plukenetii* (3) produces berries of strong deleterious properties, which are employed in the East Indies to stupefy fish or birds. C. *indicus* also affords a deadly drug.

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1. Menispermum *canadense*, *Canadian Moon-seed*. N. America.
   - 1A *Stamen flower.*
   - 1B *Petal.*
   - 1C *Stamen.*
   - 1D *Fruit.*
   - 1E *Seed.*
2. Menispermum *virginicum*, *Virginian Moon-seed*. N. America.
3. Cocculus *Plukenetii*, *Officinal Cocculus*. East Indies.
4. Cissampelos *Caapeba*, *Brava-root*. S. America.
5. Cocculus *palmatus*, *Section of Root.*
6. Cocculus *macrocarpus*, *Fruit.*
7. Cissampelos *Pareira.*
   - 7A *Pistil flower.*
   - 7B *Stamen flower.*
8. Cissampelos *tropæolifolia.*
   - 8A *Section of Fruit, showing Seed.*
   - 8B *Section of Fruit and Seed.*

The bruised stems of C. *fibraurea* yield a yellow dye, used in the East instead of turmeric. C. *palmatus* (5), of Eastern Africa, affords a valuable medicine of extreme bitterness from the root, known as Colomba root. C. *crispus* is a remedy in the intermittent fevers of the East Indies; C. *flavescens* in the Moluccas. In Arabia a spirit is distilled from the acrid berries of C. *Cebatha*. Cissampelos *Caapeba* (4) has remarkably strong veins in the leaves, and a root containing mucilage. An excessively bitter medicine, esteemed in Brazil, is derived from the root of Cissampelos *Pareira;* that of C. *ebracteata* is considered an antidote to the bite of snakes. A strong spirit is distilled from the root of C. *obtecta*, in the mountains of Gurwhal, as well as from other plants of this tribe. Several species, with large fleshy roots, are extensively dispersed over the hills and plains of India. The silvery round leaves of C. *glaberrima* resemble those of the Nasturtium or Indian Cress, and have a similar pungent taste. C. *mauritianus* is a tonic plant of Madagascar. Coscinium *fenestratum* is the "knotted plant" of the Cingalese, who prepare a medicine from slices of the wood. The bark of Chondodendron *convolvulaceum* is used in Peru as a cure for fever; some species yield also a yellow dye from the bark. From the seeds of several of the plants an oil is expressed. Thus various useful preparations are obtained from this comparatively small tribe, and serve the purposes of the natives of South America and of the East Indies. The peculiar character of the seed becoming curved as it enlarges in growth is seen more or less in all the plants. Some species of Cocculus have a power of throwing out rootlets from a broken branch; in some cases they have been seen of the length of eight feet, extending from the branch to the ground, not thicker than common packthread. Lardizabala is a shrub with compound leaves, varying in some respects from the rest of this tribe, and by some botanists made the type of a separate Order. L. *biternata* is rarely seen in English conservatories, but it grows abundantly in South America, and the fruit is sold in the markets of towns and villages throughout Peru and Chile. Hollbollia yields eatable fruit to the natives of Nepal. Stauntonia is a genus first found in China; other species have been since discovered on the range of the Himalayas, in shady cool situations, at an elevation of 5000 feet.

The plants of this Tribe are common in the tropics of America and Asia; a few inhabit the cooler parts of China and North America: they are very scarce in Africa; one only is found in Siberia. All the species grow in woods, twining around other plants. Cissampelos abounds most in America, Cocculus in Asia.

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Berberidaceæ

The Berberry Tribe

BERBERIDACEÆ.

THE BERBERRY TRIBE.

Shrubs and herbaceous plants, usually destitute of hairs, but often spiny. The leaves are alternate, compound, generally without stipules; those of the common Berberry and some other species appear to be simple leaves growing in clusters, but are jointed at the stalk, and are therefore compound leaves reduced to a single leaflet. The flowers are either solitary, branched, or in panicles; the sepals of the calyx are three, as in Diphylleia, four as in Epimedium, or six as in Berberis, with petal-like scales on the outside. The petals are the same in number as the sepals, or twice as many, having sometimes an appendage at the base in the interior. The stamens are equal in number to the petals, opposite to which they are placed; the anthers have two cells which open by valves from the lower part upwards, the same as in the Laurel tribe. The style is terminated by a circular stigma; the fruit is either a berry or a capsule, containing crustaceous or membranous seeds.

This Order is connected with Fumariaceæ and Vitaceæ.

Berberis (1), which gives its name to this tribe, is so called in Arabia; the fibrous veins of the leaf are very tough, that which runs at the margin forms a small spine at the point of each serrature; at the base of the leaf and flower-stalks is a strong, triple spine, formed of the hardened ribs of imperfect leaves. The flowers have an unpleasant odour in spring, but are of elegant appearance, and are much resorted to by bees and other insects. The filaments of the stamens possess considerable irritability; when slightly touched, they rise from the petals towards the stigma. The berries are so extremely acid, birds will seldom eat them, but when preserved with sugar they are made into jelly in some countries, and are likewise put into sugar-plums. At Verdun, and other towns in France, where *bon-bons* are the chief manufacture, they are much in request. The stem, branches, and roots yield a bright, yellow dye, chiefly used in Poland to dye leather or linen. The Berberry is worthy to be classed among our ornamental shrubs, and is particularly so in autumn, when the drooping clusters of bright red berries remain

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1. Berberis *vulgaris*, *Common Berberry.* England.
   - 1A *Flower.*
   - 1B *Petal.*
   - 1C *Stamen.*
   - 1D *Pistil.*

2. Epimedium *alpinum*, *Alpine Barren-wort.* England.
   - 2A *Flower magnified.*
   - 2B *Calyx.*

2. Epimedium *alpinum* (*continued*).
   - 2C *Stamen.*
   - 2D *Anther, open.*
   - 2E *Pistil.*

3. Diphylleia *cymosa*, *Blueberried Diphylleia.* North America.
   - 3A *Stamen.*
   - 3B *Anther, open.*
   - 3C *Anther, valves recurved.*
   - 3D *Pistil.*

for many weeks on the branches. Where it is seen growing luxuriously in favourable situations, as among the grey rocks that bound the Valley of Interlaken, or in Austria on the shores of the Danube, it cannot fail to attract the admiration of the traveller. B. *asiaticus*, growing on the Neilgherries, produces an excellent yellow dye. The fruit of B. *aristata*, another Indian species, is dried in the sun, like raisins, and sent down to the plains. B. *ilicifolia* is a beautiful species, growing near the Straits of Magellan; three kinds of Berberis are abundant on the whole chain of the Andes. Epimedium is said to be so named by Dioscorides; the four sepals of the calyx soon fall-off, the four petals are spreading and concave, and upon each lies a hollow pouch-like nectary. The leaves of Epimedium *alpinum* (2) are at first tender and drooping, after the flowers are faded they acquire size and firmness. It is only seldom found in the north of England, and in Scotland, in the shelter of woods in hilly districts. Epimedium *violaceum* grows in Japan.

Diphylleia *cymosa* is an herbaceous plant, having only two leaves, as its name imports; the berries are blue when ripe. Nandina is an evergreen shrub in Japan and China, occasionally cultivated in English gardens; it bears panicles of greenish flowers, and berries about the size of peas. Leontice *Leontopetalum* is a specimen of the herbaceous class in this Order, with flowers growing singly at the base of the leaf-stalk: the root is said to be used medicinally by the Turks of the Levant, where it grows. Bongardia belongs also to the East, the tubers are sometimes roasted and eaten in Persia. Caulophyllum *thalictroides* is a delicate little plant of North America; its principal singularity consists in being one of the few instances of a seed destitute of the usual covering: the roots are said to possess medicinal properties, and the seeds have been employed as a substitute for coffee.

These plants are disposed, chiefly in mountainous places, over the temperate parts of the northern hemisphere; rather abundantly in the northern provinces of India. In South America they are found as far south as the Straits of Magellan; none have yet been discovered in Africa, Australia, or the South Sea Islands.

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The Fumitory Tribe

FUMARIACEÆ.

THE FUMITORY TRIBE.

All herbaceous plants, either annual or perennial, with slender fragile stems, containing a milky juice. The leaves are usually alternate, much divided in a ternate manner: some species have twisted leaf-stalks, like tendrils, by means of which they climb over other plants. The flowers are very irregular; the calyx is formed of two small acute membranous sepals placed opposite each other; the petals are four in number, more or less combined in a tube, one or two of them having a spur or pouch at the base, forming a nectary; the two side petals are within the others, and are slightly united by their tips. The stamens are either four or six, divided into two sets, opposite the outer petals, very seldom all separate; the anthers are membranous, the outer one of each set is one-celled, the middle one two-celled. The ovary is terminated by a slender style, and a stigma of two compressed lobes, with two or more points. The seed-vessel is either a closed nut containing one or two polished crested seeds, as in Fumaria, or a pod with two valves and many seeds, as in Corydalis, or a succulent closed pod with two seeds, as in Sarcocapnos: in this Order is seen every gradation from a one-seeded to a many-seeded pod.

Fumaria resembles in some points Epimedium, thus forming a link with the Berberry tribe. Hypecoum shows an affinity with the Poppy tribe, but an important difference exists in the juice of Fumitories being watery, that of Poppies milky.

The general character of the Fumitory tribe is to be slightly bitter, scentless, and without any milky juice.

Fumaria *capreolata* (1) grows plentifully in various parts of England, climbing often to the height of three or four feet with its twisting leaf-stalks on other plants: the globose pod contains a single seed. Corydalis is the old Greek name for these plants. Corydalis *lutea* (2) is found among the ruins of Fountain's Abbey, and in a few other localities in Yorkshire, and in Derbyshire; the stems are extremely brittle, the fibrous roots penetrate easily among the stones of old walls, where it flourishes: this renders it a suitable plant for rock-work in gardens, although it spreads too rapidly, as the seed-vessels ripen and scatter their seeds in great profusion. Corydalis *tuberosa* (3) is remarkable for its hollow root, which has been

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1. Fumaria *capreolata*, *Ramping Fumitory*. England.
   - 1A *Flower partly separated.*
   - 1B *Seed-vessel.*
   - 1C *Seed.*

2. Coryda is *lutea*, *Yellow Corydalis*. England.

3. Corydalis *tuberosa*, *Hollow-rooted Corydalis*. Europe.
   - 3A *Stamens.*
   - 3B *Pistil.*
   - 3C *Seed-vessel.*
   - 3D *Seed-vessel, open.*

4. Dielytra *formosa*, *Blush Dielytra*. N. America.
5. Corydalis *Cashmeriana*, *Cashmere Corydalis*. Himalayas.

ascertained to contain a peculiar alkali called Corydalin. Corydalis *solida*, occasionally found in woods in Westmoreland, and frequently on the Continent, has a fleshy root, which is said to afford food to the poor Kalmucks in their winter scarcity. Corydalis *Cashmeriana* (5) is one of the fifteen species that have been discovered on the range of the Himalayas, from Nepal to Cashmere; it is a small plant, and bears but few flowers on the erect simple stalk, but is of pleasing aspect from the colouring. C. *Goviana* is very common on the Choor Mountains of the Himalayas, at 8000 feet elevation; the Hill people esteem it a valuable charm against the influence of evil spirits. The tuberous root of C. *bulbosa* was formerly used as a medicine, being bitter, astringent, and slightly aromatic. C. *nobilis*, from Siberia, is a hardy flower in English gardens. A species of Fumaria, nearly resembling F. *parviflora* of Europe, is taken in India as a remedy for ague, when mixed with black pepper.

The genus Diclytra was so named from the two spurs or pouches; the several hardy species of our gardens are from North America. Diclytra *spectabilis*, lately brought from China by Mr. Fortune, is one of the finest of this tribe, bearing long racemes of elegant pink flowers.

Sarcocapnos *enneaphylla* of Spain differs in foliage from the usual form in this tribe, the leaves being of a fleshy substance, and divided simply into three triple divisions. Cysticapnos *Africana*, of the Cape, has also simple triple leaflets.

Adlumia is an annual plant from North America, climbing to the height of fifteen feet, with rapid growth. Dactylicapnos is a climbing species belonging to the Himalayas, distinguished by its fleshy oblong berries. Dicentra *cucullaria* is employed medicinally in North America.

The plants of this tribe are dispersed chiefly over the temperate and cold regions of the Northern hemisphere, growing in woods and waste places. Like many tribes belonging to temperate climates, it extends in a few scattered species over the middle regions of the Himalayas. One species alone is found on the plains of India, flowering only in the cold season. Two species belong to the Cape of Good Hope.

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E T del.

NYMPHEACEÆ.

THE WATER-LILY TRIBE.

All herbaceous plants, growing from a prostrate stem in quiet waters, having leaves of a thick substance, either heart-shaped or of a peltate form, attached to the leaf-stalk by the centre. The young leaves are usually rolled inwards; when fully grown they lie perfectly flat on the surface of the water, or else rise up above it. The flowers are composed of four or five sepals, and numerous petals, some of which pass gradually into stamens: both petals and stamens are inserted into the large fleshy disk which surrounds the ovary, except in Nelumbium, where they are placed in several rows at the base of the disk. The filaments of the stamens are of a petal-like form; the anthers burst inwardly by a double longitudinal cleft. The ovary contains many cells and numerous seeds, surmounted by the radiating stigmas. In Nelumbium the ovary is very large, and rises high in the centre of the flower, having on its summit several short styles and simple stigmas. The nuts, containing one, rarely two seeds each, lie half-buried in the hollow cells until they are ripe, when they become loose, and fall out. The seeds of Nymphea and Euryale are enveloped in an arillus.

The radiating stigmas on the summit of the enlarged seed-vessel, and a narcotic milky juice, are connecting links with the Poppy tribe; the dilated disk of some kinds of Peony resembles partly that of Water-lilies, thus forming a link with the Crowfoot tribe.

Nymphea *alba* (1) is the most beautiful of British water-plants; the flower, rising above the water among the flat green leaves, opens in the morning and closes in the afternoon. The roots or creeping stem are used for dyeing grey in Ireland and the Highlands of Scotland; they are also useful in tanning leather. Nuphar *luteum* (3) grows in America, as well as in several countries of Europe: in Turkey a cooling beverage is prepared from the flowers. The stems contain a great portion of starch, and, if well washed, afford wholesome food. The seeds are also eatable, and are used by the poor peasants of some countries in times of scarceness. Nelumbium *speciosum* (4) is the once celebrated Lotus of Egypt, which was considered sacred, and employed as an emblematical ornament in the paintings of their temples. It is also frequently found on the ancient monuments of India, where it abounds in almost every part of the country, covering the waters with its magnificent flowers and large leaves, on which aquatic birds walk. The

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1. Nymphea *alba*, *White Water-lily*. England.
2. Nymphea *pygmea*, *Pigmy Water-lily*. China.
3. Nuphar *luteum*, *Yellow Water-lily*. England.
4. Nelumbium *speciosum*, *Sacred Bean*. India.
5. Nymphea *cærulea*, *Blue Water-lily*. Cape of Good Hope.

long stalks are cooked and eaten in Japan; the roots and seeds are esteemed as food in China, being eaten fresh in summer, and preserved in salt and vinegar for winter use. Nymphea *lotus*, a pink species about the size of our white Water-lily, still grows abundantly in Lower Egypt. The leaf and flower-stalks of several kinds of Nelumbium and Nymphea contain spiral vessels, out of which the Hindoos make wicks for the sacred lamps in their temples. Euryale *ferox* grows in China and India,—very plentifully in the lakes of Chittagong, eastward of Calcutta, where it is called by the natives *Makannah;* it bears flowers a great part of the year, but they are small, of a pale purple colour, and not nearly so ornamental as those of the tribe usually are. The stalks, calyx, and under-surface of the leaves are beset with strong prickles: the nuts are farinaceous; after being heated in sand they become light and spongy, and fit for food. The tubers and seeds of several kinds of Nymphea are roasted and eaten by the negroes of Senegal. Victoria *regina*, the most gigantic and beautiful of water-plants, belongs to the rivers of Guiana, where it was discovered by Robert H. Schomburgk in 1837, in great profusion. The leaf is from five to six feet in diameter, green above and red on the lower surface, having a broad rim around it. The flower measures fifteen inches across, and is composed of numerous petals of a deep rose colour in the centre, gradually becoming a pure white towards the exterior; the stalks and calyx are, like those of Euryale, covered with strong prickles: the seeds are eaten by the native Indians.

India is the principal station of this Order, all except Nuphar being found there. Nelumbium is the most abundant genus of the East Indies. Some inhabit the still waters of the temperate and tropical regions of the whole northern hemisphere, both of the Old and the New World; a few grow in the southern hemisphere, at the Cape of Good Hope and elsewhere. Victoria is the representative of the Order in South America.

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PAPAVERACEÆ.

THE POPPY TRIBE.

Herbaceous plants and shrubs; leaves alternate on the stem, either simple or divided; without stipules at the base of the leaf-stalk. The flower-stalks are generally long, bearing flowers singly; the calyx is composed of only two or three sepals, which fall off when the flower expands; the petals are usually four, sometimes six,—in Bocconia they are wanting. In the bud state the petals are usually crumpled. Stamens numerous, attached to the base of the pistil, the style of which is short; stigmas, either two or many, forming a rayed star on the top of the ovary. The seed-vessel is either a capsule as in the Poppy, or long and pod-shaped as in Glaucium, the Horn Poppy, containing numerous seeds of a fleshy, oily nature. A milky juice pervades the plants of this Order, possessing narcotic properties; it abounds in the full-grown capsules of Papaver *somniferum*, the Opium Poppy (1). This plant grows in sandy ground in the fen districts of England, but is much more plentiful in the south of Europe, where it was probably first introduced from the East. In Germany it is cultivated chiefly for the sake of the seeds, the oil contained in them being used for various purposes; mixed with olive oil, it is much employed in cookery. The opium Poppy was known and cultivated by the ancients in the time of Dioscorides, and Homer mentions it as being valuable for assuaging the agonies of wounded heroes. In the East it is grown in very large quantities for the opium, which is obtained from incisions made in the half-ripe capsules: when thickened by exposure to the sun, and made into cakes, it is a great article of commerce throughout the East. Glaucium *luteum* (3) grows on many parts of the coast of England, among the loose stones and sandy soil; the singular pale-green foliage, and the bright yellow flowers, adorning the barren shore. Chelidonium, or Celandine, is common on waysides in many parts of England; it is said to have been so called after the Greek name of the swallow, as it appears about the time of the arrival of that bird, and withers at its departure in the autumn. The whole plant contains an orange-coloured juice of intensely acrid property, which is used medicinally for the eyes. Argemone *Mexicana*, a garden-plant in this country, is a common weed in the West Indies, with a prickly fruit about the size of a fig; this abounds in a thick milky juice, which congeals and becomes yellow in the open air, resembling gamboge. It is considered beneficial in medicine, both in the East and West

1. Papaver *somniferum*, *Opium Poppy*.
   1a *Capsule*.
2. Papaver *Rhœas*, *Common Corn-poppy*. Corn-fields, England.
3. Glaucium *luteum*, *Yellow Horn-poppy*. Sandy Sea-shores, England.
4. Meconopsis *aculeata*. Himalayas.
   4a *Seed-vessel*.

Indies; and the Brazilians employ it as a remedy against the bite of serpents. Sanguinaria *Canadensis*, which grows in the woods of Canada, has an abundant red juice in all its parts, with which the Indians stain themselves; the root is tuberous and fleshy: from each tuber grows a single leaf, and a stalk bearing one delicate white flower.

Some plants of this tribe form connecting links with other tribes. The long pods of Glaucium and Eschscholtzin very nearly resemble in appearance those of the cruciferous tribe. Platystemon, a genus found in California and Siberia, forms a link with the Crowfoot tribe.

The prevailing colours of the flowers are yellow, red, and white; none are blue, although Glaucium *violaceum* is of a purple hue. Papaver affords one of the very few instances of a red flower in England, and it is remarkable that these all occur in exposed sunny places, chiefly in corn-fields,—a fact that coincides with other observations on the necessity of a bright sunlight for the development of a red colour. In preparing carmine, it has been found essential to carry on the process in the full light of the sun.

The different plants of this Order are dispersed most abundantly in Europe, scattered species being found but rarely in other parts of the world. Two are known to belong to Siberia, three to China and Japan, one to the Cape of Good Hope, one to North America, and six to tropical America. Those which are perennial are chiefly natives of mountainous districts. Papaver *rhœas* (2) and P. *dubium* of England are now found in gardens in India, probably introduced from Europe. Papaver *glabrum*, the only native Indian species, grows in corn-fields on the terraced slopes of the Himalayas, at an elevation of from 5000 to 7000 feet. Meconopsis is the most widely-scattered genus of this Order; M. *cambrica* belonging to Westmoreland and Wales; M. *aculeata* being common on the Himalayas, and another species growing in North America.

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PURPUREORUM

The Side-saddle Flower-Fly

SARRACENIACEÆ.

THE SIDE-SADDLE FLOWER TRIBE.

A few herbaceous, perennial plants, with fibrous roots, growing in bogs and swamps. The leaves are radical, having an enlarged tubular stalk, at the top of which the true leaf is articulated. The stem bears one or more flowers, usually of an herbaceous hue, seldom of a pure, bright colour, in some species white. The flower is composed of five concave petals, a calyx of five sepals, and sometimes a three-leaved involucre, as in Sarracenia (1); or it has a calyx of four to six sepals, much imbricated, and is destitute of a true corolla, as in Heliamphora (3). The stamens are many, attached to the base of the pistil; the anthers are oblong, two-celled, bursting internally and longitudinally. The ovary is globular, formed of five united carpels; the style is a simple column, expanded at the summit into a large leafy plate, having a stigma at the five angles in Sarracenia; or the ovary is three-celled, with a simple style terminating in a truncate point in Heliamphora. The capsule contains numerous small seeds, slightly warted in those of Sarracenia, or winged with a brown membranous expansion in those of Heliamphora: they cover the slender divisions which proceed from the centre into each cell.

This Order has some affinity with Papaveraceæ on account of the dilated, foliaceous stigmas; the carpels and fruit agree in some respects with those of Nymphæaceæ.

No useful properties have as yet been discovered in these plants.

The parts of the flower are liable to great variety of condition; the deviation of Heliamphora from the general type of the Order is analogous to what occurs in the Crowfoot tribe, where Caltha varies in the same manner from the true Ranunculus type, having a calyx of coloured sepals, but no real corolla. The hollow stalks of the leaves of this tribe are of singular construction, and are lined with hairs of a peculiar nature, the physiological action of which is not yet ascertained. They have been found containing water, which it is supposed may be valuable to small animals and birds during the droughts in North America. They also entrap insects by means of the hairs. The leaves are said to shut over the hollow stalks like lids in dry weather, and thus prevent the evaporation of the water.

Sarracenia was so named by Tournefort, after Dr. Sarrazin, a French phy-

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1. Sarracenia *purpurea*, *Purple Side-saddle Flower.* Canada.
   - 1A *Pistil.*
   - 1B *Section of Ovary.*
   - 1C *Seed magnified.*
2. Sarracenia *variolaris*, *Hook-leaved Side-saddle Flower.* Carolina.
3. Heliamphora *nutans*, *Nodding Heliamphora.* Guiana.
   - 3A *Stamens and Pistil.*
   - 3B *Section of Seed magnified.*
   - 3C *Section of Ovary.*

sician residing in Quebec, who discovered this remarkable genus in Canada. Several species have since been found in the bogs of Carolina and Virginia. Sarracenia *purpurea* (1) was brought to England by Tradescant, in 1640; this, as well as other species, will flourish under cultivation, by making a kind of artificial bog of peat and moss, and keeping the plants well supplied with water to their fibrous roots. Sarracenia *variolaris* (2) has transparent glands at the back of the upper part of the hollow stalk.

The leafy stigma was formerly considered an essential character of this tribe, but the discovery of Heliamphora *nutans* (3) by Sir Robert Schomburgk shows that opinion to be unfounded. In this flower the stigma is reduced to a mere termination of the style. The enlarged leaf-stalks of this plant bear an extraordinary proportion to the small leaf at the end; the hairs which densely clothe the mouth of the pitcher are perceived, when magnified, to be thick, conical, and striped; those which are scattered about the lower portion are smaller, and arise from a tubercle, appearing to be composed of a single cell forming a hollow tube, probably filled with a fluid when in a living state. The middle part is destitute of hairs, but often covered with numerous minute glands. These curious hairs and glands doubtless perform an important function in the economy of the leaf, and thus of the whole plant; but until observations have been made on living specimens no accurate knowledge can be obtained on the subject.

All the plants of this Order are inhabitants of the bogs of North America, with the exception of Heliamphora *nutans*, growing at an elevation of 6000 feet above the sea, in the marshy savannahs of Mount Roraima, on the borders of British Guiana.

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CRUCIFERÆ.

The Cruciform Tribe

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CRUCIACEÆ.

THE CRUCIFORM TRIBE.

HERBACEOUS plants, and a few half shrubs. The leaves are alternate. The flowers are chiefly yellow or white, some are purple, without bracts, generally on branching stalks. The sepals of the calyx are four, falling off before the capsule is enlarged. The petals are four, cruciform, alternate with the sepals, occasionally toothed. The stamens are six, the four longest in pairs, the two short ones single and placed between the pairs. On the disk are green honey-glands, between the petals and the stamens and ovary. The ovary is above the calyx and disk, with plates from the edges usually meeting in the centre. The stigmas are two, placed opposite the plate-bearing seeds. The seed-vessel is a silique, a long pod containing many seeds; or a silicule, a short pod with few seeds; opening by two valves separating from the central plate, or remaining closed. The seeds are attached by a little cord in a single row to each side of the plate, generally pendulous; they have no albumen.

This Order has close affinity with Capparidaceæ, and in some points it agrees with Papaveraceæ, but the structure of the seed-vessel and seed is peculiar.

Nitrogen exists in these plants; some are very acrid, but none poisonous; many are stimulant and extremely wholesome; the seeds yield oil.

This is one of the most clearly defined of the Natural Orders, but is a remarkable instance of the variety developed from one type. Brassica is the principal genus, being the stock from whence are derived the numerous varieties of Cabbage, Turnip, Cauliflower, Rape, and others; thus affording a large supply of nutritive food, and a considerable quantity of oil. B. *oleracea* (1) grows abundantly on the chalk cliffs of Dover, but in its natural condition would scarcely be recognised as the parent of the thousand-headed Cabbage, or the Brussels Sprouts. The different kinds all require a temperate as well as moist climate; Britain and Holland are the countries most favourable to their cultivation; in Germany also they succeed, and an immense supply of *Kohl* is consumed in the fermented state of *Sauerkraut*. The tree-kail, or cow-cabbage of France, attains the height of 16 feet. B. *rapa* furnishes the various kinds of Turnip, of great importance as food for cattle. B. *napus* is Rape, the

1. Brassica *oleracea, Common Cabbage.* Chalk Cliffs, England.
   1A *Stamens and pistil.*
   1B *Pistil.*
2. Lunaria *biennis, Honesty.* England.
3. Nasturtium *officinale, Water-cress.* Streams, England.
4. Erysimum *Petrowskianum.* Palestine.
5. Petrocallis *pyrenaica.* Pyrenees.
6. Iberis *gibraltarica, Spanish Candytuft.* Gibraltar.
7. Cheiranthus *Cheiri, Wall-flower.* England.
   7A *Silique, opened.*
   7B *Section of Seed.*
8. Schizopetalon *Walkeri.* Chile.
9. Silicule of Thlapsi *latifolium.*

seeds of which contain an excellent oil. B. *sinensis* is cultivated on hills and plains in northern China, chiefly for the sake of the oil; of late years it has been introduced into France, and is found to afford valuable food; the golden flowers are highly fragrant, as are several of this tribe. In Kerguelen's Isle a kind of cabbage is acceptable to sailors who land there. Nasturtium *officinale* (3) contains Iodine; of our native vegetables it is the cheapest and most wholesome, and is of such ready growth that a never-failing supply is maintained for the poorer classes; so great is the demand for this humble plant in the metropolis, that in some gardens in the vicinity, as at Watford in Hertfordshire, it is cultivated in small shallow canals in perennial plenty. N. *pusillum* is used in Brazil as a medicine. Sinapis yields a salad in its first pair of leaves, and mustard from its pungent seeds. Lepidium, the early Salad-cress. Cochlearia, the stimulant Horse-radish. Crambe *maritima*, transplanted from our south shores into gardens about a century ago, becomes when grown and bleached the delicate Sea-kail. Raphanus *Raphanistrum* is a common English weed; R. *sativus*, from China, furnishes the eatable Radishes; R. *caudatus* bears a pod longer than the whole plant. Moricandia *arvensis* of the South of Europe is excessively acrid, yet a favourite food of camels. Farsetia *parviflora* is the Arabian Cress of the Desert. Lunaria (2) is so called from its moon-shaped silicules, which are of a silvery whiteness when ripe. Erysimum was a plant known to the ancients; E. *Petrowskianum* (4) is a late addition to our gardens. Petrocallis is one of the mountain species which adorn the rocks of the Alps and Pyrenees. The chief favourite of this tribe is the Wall-flower (7); when wild, on old walls and ruins, the flowers are pure yellow, but the garden variety is streaked with the richest crimson; the scent is extremely fragrant, and few spring flowers give so much gratification to all classes. Some species of Cheiranthus belong to Madeira and Teneriffe. Iberis is an exception to the regular coralla, two of the petals being larger than the others. I. *amara* grows on chalk soil in England; I. *umbellata* is the garden Candy-tuft. I. *gibraltarica* (6) is one of the species inhabiting Spain. One of the prettiest of our spring flowers in meadows and copses is the Cardamine *pratensis*, Cuckoo-flower, mingling its pale purple blossoms with Cowslips and Wood-anemones. Isatis *tinctoria*, Woad, contains a blue dye, used by the Britons to colour themselves; before Indigo was plentiful, it was employed for dyeing cloth. Hesperis *tristis* is the night-scented Rocket of Italy, of a dull hue, like the Mathiola *tristis*, also fragrant by night. The various double Stocks produced from M. *incana* of our south cliffs are well-known. Anastatica *Hierochuntia*, the Rose of Jericho, has given rise to many superstitious tales; as the plant withers it becomes uprooted, and rolls up into a dry ball; when moistened it expands to its original shape, the pods open, and the seeds are scattered. Subularia *aquatica* is a singular example of flowers opening below the surface of water. Schizopetalon (8) differs from the usual type in having deeply notched petals, and four leaves to the seed instead of two. Brachycarpea *varians* is one of the few shrubby cruciferous plants. The hairs of the leaves or stalks are very interesting objects of examination under the microscope; those of Brassica *oleracea* are simple; of Draba, forked; of Alyssum, stellate at the summit.

CAPPARIDACEÆ.

THE CAPER TRIBE.

Trees, shrubs, and herbaceous plants; the leaves are alternate, stalked, undivided or palmate, without stipules at the base of the leaf-stalks, but sometimes having spines in their place. The flowers are solitary, or branching, or in a cluster at the ends of the branches; the calyx has four sepals, either nearly distinct, or cohering in a tube of unequal size and shape; the petals are four or eight, folded over each other in the bud, occasionally unequal or wanting. The stamens are usually numerous, seldom only six, four of which are larger than the other two; in Physostemon (10A), two stamens have a singular appendage immediately below the anther. The disk on which the stamens are placed is at the top of the prolonged stalk of the ovary; it is sometimes developed into a fleshy round or stalk-like body, or into a plate of various form, bearing honey glands, with anthers on one side of it. The ovary is one-celled, with two or more ribs on the edge, to which the ovules are attached. The style is long and slender, or wanting; the stigma generally round. The fruit is either a pod, gaping when ripe, or a berry with one cell. The seeds are generally many, very rarely only one, kidney-shaped, without albumen.

These plants have considerable resemblance to the Cruciform tribe, but are distinguished by the usually numerous stamens, and the kidney-shaped seeds. The stalked ovary indicates affinity with Passifloraceæ.

Stimulant, pungent properties exist in the flowers and fruit.

The Arabic denomination of the chief plant of this Tribe is *Kabar*, from which the Greek, Latin, and modern European names have all been derived. The various species of Capparis are low shrubs, differing in appearance, some bearing delicate flowers, and of considerable beauty; but the general character is thorny, rough, and wild; some, which inhabit the deserts, have a remarkably dreary aspect, none more so than Capparis *aphylla;* the oblong leaves soon wither and fall off, leaving only the slender stiff branches, with small clusters of flowers and

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1. Capparis *spinosa, Common Caper-tree.* South Europe.
   1A *Flower-bud, opened.*
2. Capparis *Breynia, Oleaster-leaved Caper-tree.* West Indies.
3. Cratœva fragrans, *Sweet-scented Garlic-pear.* Sierra Leone.
4. Polanisia *chelidonii, Celandine-flowered Polanisia.* East Indies.
5. Sodada *decidua.* Egypt.
6. Capparis *ovata, Fruit.*
7. Cratœva *Roxburghii, Fruit.*
   8A *Seed-vessel of* Capparis *Sinclairii.*
   8B *Cross-section.*
   9A *Section of Fruit of* C. *Ægyptiaca.*
   9B *Seed.*
   10A *Flower of* Physostemon.
   10B *Seed, magnified.*

strong spines. C. *horrida* is nearly similar, beset with hooked spines, in pairs, at the base of the flower-stalks. C. *spinosa* (1) is the most useful species, owing to its agreeably pungent qualities; it is very commonly found growing, after the manner of the Bramble, in rocky, stony places, or amongst ruins, in Southern Europe. It is also cultivated in the South of France, and in Sicily, for the sake of the flower-buds, in which the peculiar pungent properties are already fully developed; they are gathered whilst young, and preserved as a stimulating condiment to insipid boiled meats. The chief supply comes from Sicily, and the isles and coasts of the Mediterranean; the unripe fruit has similar properties, and is also prepared as a pickle. Those buds which are suffered to remain on the plant continue to expand singly, in a continued series, and are beautiful, although very short-lived. C. *Ægyptiaca* affords a refreshing and wholesome addition to the food of the Egyptians. C. *rupestris* to the Greeks. C. *sepiaria* has an umbel of small flowers at the ends of the branches, and a pair of hooked spines at the base of each leaf-stalk. Its nature makes it a good hedge-shrub in India, where it is thus used around Shikarpoor and elsewhere. The pods of C. *Breynia* (2) are twelve inches in length. Cratœva was named in honour of Cratœvus, a Greek botanist who lived in the time of Hippocrates. C. *fragrans* (3) was brought from Sierra Leone at the close of the last century, having been discovered there by Afzelius, a professor of botany in the University of Upsal; he found it spreading over the rocks, near rivers, amongst the mountains, in the same kind of localities as in the island of Bananas, where he had previously seen the plant. The flowers are like others of this tribe, of short duration, but come forth in succession during several weeks, and are highly fragrant. C. *gynandra* has been called the Garlic Pear; the bark of the root has powerful blistering properties. The berries of C. *Nurvala* are said to be juicy, and of pleasant flavour. C. *Tapia*, of the East Indies, bears a fruit as large as an orange, filled with a mealy kind of pulp, having the smell of garlic; the bruised leaves are employed to alleviate inflammation; the bark is bitter and tonic. The natives of Tahiti consider C. *religiosa* as peculiarly suited to burial grounds, and plant it on the graves. Polanisia (4) is one of these plants, having a slender seed-vessel, like the Cruciferous tribe in form, although the seeds are attached differently. Cleome shows still more affinity with that tribe, the flowers having six stamens, of which two are shorter. The seed-vessel usually remains upright, near the stem when ripe. C. *violacea* has a long drooping capsule; this species is frequent in vineyards in Portugal. Colicodendron is said by Martius to be injurious to cattle; and the species of Capparis called *Fruta de Burro* bears an extremely poisonous fruit.

This tribe abounds in the Tropics and adjacent countries; in Africa the species are numerous. Capparis extends to the south of Europe. Cleome is found in Portugal, Polanisia as far north as Canada; a few species grow in the northern provinces of the United States.

BIXACEÆ.

THE ARNOTTO TRIBE.

Small trees and shrubs; the leaves are alternate, simple, usually smooth at the edges, on short stalks, of a leathery substance, often marked with transparent round dots. The flower-stalks grow from the base of the leaf-stalk, and are either single or many-flowered. The sepals of the calyx are from four to seven, slightly united at the base; the petals are of the same number, and alternate with them, very rarely absent. The stamens are equal in number to the petals, or twice as many, or some multiple of them; occasionally some of them are changed into honey-bearing scales; the anthers are two-celled. The ovary is nearly round, sessile, or shortly stalked, containing one or more cells; the style is very slender or absent; the stigmas are of the same number as the valves of the ovary, more or less distinct. The fruit is one-celled, either a capsule with four or five valves, the centre filled with a soft pulp, as in Bixa, or a fleshy berry, as in Flacourtia. The seeds are generally invested with a thin skin formed by the withered pulp.

The most useful shrub of this tribe is Bixa *orellana*, growing to the height of seven or eight feet. The prickly fruit contains from thirty to forty angular seeds, enveloped in an orange-red pulp, from which the Arnotto dye is prepared; after boiling, and being separated from the seeds, it is formed into hard lumps, and wrapped in leaves ready for sale. The Spaniards of South America mix it with their chocolate, to heighten the colour and improve the flavour. Both in Holland and England it is used to impart a red hue to cheese; it formerly served as a dye for an orange-red tint, called "aurora." The American Indians paint themselves with this material; they also make a kind of broth from the roots, which possess the same qualities as the seeds, though in a less degree. The bark affords fibres for ropes much used in the West Indies; the wood is well qualified to produce fire by friction, and is often selected for that purpose. The natives of Bengal employ the red pulp of Bixa as a temporary dye in their festival of Krishna; although not indigenous in India, it is cultivated successfully as far north as Delhi.

Flacourtia was named after De Flacourt, the commander of a French expedition to Madagascar in 1648, who made a careful examination of the botanical productions of the island, and found the species called by the natives *Ramontchi* (2). The fruit has the appearance of plums, but within are twelve or more small seeds

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1. Bixa *Orellana, Heart-leaved Arnotto.* West Indies.
   1A *Pistil and Stamens magnified.*
2. Flacourtia *Ramontchi, Madagascar Plum.* Madagascar.
3. Flacourtia *inermis, Thornless Flacourtia.* East Indies.
   3A *Stamen magnified.*
   3B *Flower magnified.*
   3C *Fruit.*

the size of those of the apple: the natives are very fond of the fruit, but Europeans find the flavour unpleasant, although sweet. A small island near the coast of Madagascar is covered with a grove of these trees, and has been named Ile aux Prunes. The fruit of Flacourtia *inermis* (3) is eaten in the Moluccas; that of F. *sapida* and F. *sepiaria* has a pleasant acidity: an infusion of the latter is a remedy against the bite of snakes, and the bark is used medicinally on the coast of Malabar. The young leaves of F. *cataphracta* are also considered medicinal in India.

The berries of Roumea are eaten in Ceylon. The pulpy fruit of Oncoba is sweet, and affords food in Nubia. Lætia *apetala*, of tropical America, yields a balsamic resin, becoming white in the open air like that of sandarach. Aphlora *teiformis*, is a shrub of the Isle of France, where it is valued for the medical properties of the bark. Hydnocarpus *venanata* is well known in Ceylon for its property of intoxicating fish.

Flacourtia *Ramontchi* and F. *inermis* have both been introduced into Bengal, where they now flourish. Other species are found throughout India on the plains, and along the tract of jungles at the base of the Himalayas. In Nepal they inhabit the low hot valleys, or grow near the rivers.

Almost all the plants of this Order are natives of the hottest parts of the East and West Indies, Africa, and the adjacent islands. Two or three species belong to the Cape of Good Hope; one or two have been discovered in New Zealand; none belong to Europe.

Imitated

PASSIFLORACEÆ.

THE PASSION-FLOWER TRIBE.

Herbaceous plants or shrubs, usually of a climbing habit, very seldom erect. The leaves are alternate, with foliaceous stipules, the leaf-stalks usually having glands. The flowers grow either from the base of the leaf-stalk, or at the ends of the branches; they have often a three-leaved involucre immediately beneath them, which falls off before the flower expands. The calyx has generally five sepals, sometimes of irregular form, the inner surface usually coloured, and forming in appearance a part of the flower itself; the lower part is combined into a tube of variable length, the sides of which are lined by slender filaments. The petals are five, arising from the summit of the tube of the calyx outside the filaments; they are sometimes irregular, and sometimes wanting; in the bud state they are folded one over the other. The stamens are five, united in one set, rarely more, surrounding the stalk of the ovary; the anthers are linear, turned outwards, and bursting horizontally in two cells. The ovary is at the top of a long stalk, and contains one cell; three styles with spreading stigmas arise from the point. The fruit is stalked, oval, containing many seeds attached to the interior by small stalks, and surrounded by a pulpy covering.

The most singular feature of this remarkable order is the filamentous coronet of rays encircling the orifice of the tubular calyx; these annular appendages appear to be of an intermediate nature, between petals and stamens.

Smeathmannia forms a connecting link with Samydaceæ, and some resemblances exist with the gourd, the caper, and the violet tribes.

Although many of these plants have wholesome fruit, yet some possess rather dangerous qualities.

Passiflora was so named by its first discoverers in the forests of South America, who, being zealous Catholics, imagined they perceived, in the singular arrangement of the interior of the flower, a resemblance to those emblematical images of the Passion of Christ which they were accustomed to form. Various species abound in the woods of Brazil and other countries of South America, climbing from tree to tree in extreme profusion, adorning them with their beautiful flowers, and yielding a refreshing fruit, sometimes of a bright purple colour. Passiflora *edulis* (1), P. *maliformis* (3), and several other species, produce fruit in this country, but it

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1. Passiflora *edulis*, *Eatable-fruited Passion-flower.* West Indies.
2. Passiflora *racemosa*, *Racemose Passion-flower.* Brazil.
3. Passiflora *maliformis*, *Sweet Calabash, Fruit.* West Indies.
4. Tacsonia *mollissima*, *Downy Tacsonia.* Santa Fé de Bogota.
5. Smeathmannia *lævigata*, *Smooth-leaved Smeathmannia.* Sierra Leone.

does not fully ripen. P. *racemosa* (2) is one of those which flower at the ends of the branches, and is of extreme beauty and elegance; upwards of fifty flowers come forth in succession on one branch: the wide keel of the calyx of this species causes the buds to appear deeply five-winged. P. *quadrangularis*, the Granadilla, has eatable fruit, but the root is powerfully narcotic, and is cultivated in the French colonies for its medicinal property, called *Passiflorine*. P. *contrayerva* has also a medicinal root. The flowers of P. *rubra*, in Jamaica, yield a tincture used as laudanum. The leaves of some species are employed medicinally by the Brazilians.

Tacsonia (4) is so called from its Peruvian name, *Tacso*; it is one of the most graceful of climbers, growing to a vast height with great rapidity, where light and warmth are favourable; bearing numerous flowers. The fruit of this and other species of Tacsonia are eatable in South America.

Smeathmannia *lævigata* (5) is an example of an erect shrub in this Tribe; it was discovered by a traveller of the name of Smeathmann, in Africa.

Paropsia *edulis*, a Madagascar shrub, yields a wholesome fruit to the natives.

The chief station of this Tribe is South America, where the woods abound with various species; many also are found in the West Indies. One or two extend northwards in North America; several grow in Africa, and the neighbouring islands; a few have been found natives of the East Indies: Passiflora *Lechenaultii* on the Neelgherries, and P. *Nepalensis* in Nepal. One species of Passiflora extends to New Zealand. Disemma prevails in New Holland. Tacsonia seems to be confined to South America. Modecca belongs to the East Indies, Java, and the northern coast of New Holland.

VIOLACEÆ.

THE VIOLET TRIBE.

Herbaceous plants and shrubs, the leaves of which are simple, usually alternate, sometimes opposite, having stipules at their base. The flowers are of various forms; the sepals of the calyx are five, permanent, imbricated in the bud, usually elongated at the base. The petals are five, attached to the base of the pistil, regular or irregular; one being elongated into a horn, as in Viola *odorata;* of unequal size, as in Ionidium; or of equal size, as in Alsodea. The stamens are five, alternate with the petals, or in a few instances opposite to them, inserted on the disk of the base of the pistil, often unequal; the anthers are two-celled, bursting inwardly, either separate or cohering, and lying close upon the ovary; the filaments are dilated, and lengthened beyond the anthers; in the irregular flowers, two of them are generally furnished with an appendage, or gland, at the base. The ovary is one-celled, many seeded, rarely with only one seed. The style is single, with an oblique, hooded stigma; the capsule has three valves, bearing the seeds on a thin plate along the centre of each: the seeds are numerous, as in Viola, or of a definite number, as in Alsodea, round or winged, often with a swelling at the base.

This Order has some affinity with Droseraceæ, and the fruit of Corynostylis connects it with the Passion-flowers; but the position of the anthers, on the middle instead of at the top of the filament, is one distinguishing mark.

The chief character of the violet tribe is the emetic property of the roots, which is very powerful in the South American species, and exists in a less degree in those of Europe.

Viola *odorata* (1) ranks amongst the select favourites of the floral kingdom, and has been duly celebrated in all countries where it flourishes; it may be found in woods, and on sheltered banks in many parts of England, as well as on the continent of Europe; it grows also in Palestine, China, and Japan. The roots,

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1. Viola *odorata*, *Sweet Violet.* England.
   - 1A *Pistil and Stamens.*
   - 1B *Stamen with appendage.*
   - 1C *Pistil.*
2. Viola *tricolor*, *Heart's-ease.* England.
   - 2A *Pistil.*
3. Erpetion *reniformis*, *Spurless Violet.* New Holland.
4. Corynostylis *Hybanthus.*
   - 4A *Seed-vessels.*
   - 4B *Seed.*
4. Corynostylis *Hybanthus* (*continued*).
   - 4C *Pistil and Calyx.*
   - 4D *Stamens.*
   - 4E *Stamen.*
   - 4F *Cross-section of Ovary.*
5. Ionidium *Itoubou.* Guiana.
6. Alsodea *Physiphora.* Brazil.
   - 6A *Pistil and Stamens.*
   - 6B *Pistil.*
   - 6C *Cross-section of Ovary.*

leaves and flowers, all possess medical qualities in a slight degree; a tincture made from the flowers is a useful chemical test. Some travellers have observed the flowers to be used in making sherbet in Turkey, and it is related by ancient historians that the Romans prepared a kind of wine from them. Viola *tricolor* (2) in its natural state is frequently found in corn-fields; in the highly cultivated condition to which it has been brought by the skill of modern florists it is a much admired flower, but cannot be admitted in groups of natural orders. Viola *canina* is widely dispersed, and is said to be strongly medicinal. V. *ovata* is considered a remedy for the bite of rattlesnakes. The species are generally of a hardy nature; three inhabit Iceland; V. *cheiranthifolia*, a downy-leaved Pyrennean species, is the last flowering plant on the Peak of Teneriffe, at an elevation of 11,200 feet above the sea, on the verge of the barren pumice and lava.

Erpetion *reniformis* (3) is a hardy little plant from New Holland, of elegant aspect, but not fragrant.

Corynostylis *Hybanthus* (4) inhabits the primæval forests on the shores of the Amazon, and particularly near the confluence of the Yapura in the province of Miranha. It is of a shrubby nature, having a stem about three inches in diameter, growing to the height of three or four feet, partly climbing over other trees. The flowers are very irregular, two petals very small, the two side petals wider, the lower petal hooded, and prolonged into a tube or horn. The stamens are hairy at the back, the two placed under the horned petal have two downy prolongations at their base into the tube.

Ionidium *Itoubou* (5), a species so called from the native name, grows on sandy ground in various parts of Guiana, bearing flowers nearly all the year; it is usually about two feet high, covered with a grey down; the flowers have a singular appearance, the four smaller petals being usually rolled up, the lower large one only expanded. A pretty variety, with blue flowers, is very common in Guiana. I. *parviflorum* and other species are used as true Ipecacuanha in Peru and the West Indies. I. *suffruticosum*, of South America, grows also abundantly in the valley of the Ganges.

Alsodea *Physiphora* (6) is an example of the regular flowers of this Tribe; it is a shrub thirty or forty feet high, with stem and spreading branches of a greyish hue: the graceful flowers on a slender stalk resemble in appearance the Lily of the Valley, though of much smaller size. Other species of Alsodea are natives of Madagascar.

Conohoria *Lobolobo* of Brazil has mucilaginous leaves, which are boiled and eaten by the natives. Hymenanthera is an evergreen shrub of New Holland.

The different species of Viola belong chiefly to Europe, Siberia, America, and the mountain ranges of India, a few only belong to the Tropics of Asia. In South America this tribe abounds, but the plants differ considerably from those of Europe, being nearly all shrubs, whilst the northern species are almost entirely herbaceous. Alsodea and its immediate allies are exclusively natives of South America, and Africa, except Pentaloba, which inhabits the Malay Isles.

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POLYGALACEÆ.

THE MILKWORT TRIBE.

Trees, shrubs, and herbaceous plants, some of which are twiners. The leaves are generally alternate, sometimes opposite, mostly simple, and always without stipules. The flowers are usually on branching stalks, often small and inconspicuous, but in some instances showy. The flower-stalks have small bracts. The sepals of the calyx are five, very irregular, distinct; the two inner side sepals are usually large, of the colour of the petals, and form the wings of the flower. The petals are commonly three, one of which is larger than the rest, and is the keel; sometimes they are five, two minute petals being placed at the sides; the keel is either entire at the edge and bare or crested at the back, or it is divided into three lobes at the edge, and destitute of a crest. The stamens are unequal, usually eight, combined in a tube which is split opposite the upper sepal; sometimes four and distinct. The anthers are club-shaped, mostly one-celled, and opening at the point. The ovary is above the base of the flower, compressed, with two or three cells; the style is simple, curved, entire, or lobed; sometimes very oblique and hooded at the top; the stigma simple. The fruit usually opens through the valves, occasionally closed, membranous, fleshy, leathery, or drupaceous, winged or not. The seeds are pendulous, naked, or clothed with hairs; the outer covering crustaceous, the inner membranous; albumen abundant, fleshy.

The hooded stigma connects these flowers with Violets; in the form of corolla there is a resemblance to the Pea tribe, but in structure and properties there is most affinity to the Sapindaceæ.

Milky roots and intense bitterness are the prevailing qualities of this Tribe.

Polygala *vulgaris* (1) is one of the most curiously constructed of our native flowers. It is frequent on gravelly, heathy pastures, and is worthy of minute examination. The two enlarged side sepals are of a blue colour, like the petals,

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1. Polygala *vulgaris, Common Milkwort.* England.
   - 1A *Flower.*
   - 1B *Seed-vessel and Calyx.*
2. Polygala *cordifolia, Heart-leaved Polygala.* Cape of Good Hope.
   - 2A *Calyx.*
   - 2B *Crested Petal.*
   - 2C *Stamens and Petals.*
   - 2D *Pistil.*
3. Polygala *chamæbuxus, Box-leaved Polygala.* Switzerland.
4. Securidaca *tomentosa, Woolly-leaved Securidaca.* Meadows, Brazil.
   - 4A *Seed-vessel of S. erecta.*
5. Muraltia *mixta, Heath-leaved Muraltia.* Cape of Good Hope.
   - 5A *Calyx.*
6. Mundia *spinosa, Spiny Mundia.* Cape of Good Hope.
7. Root of Polygala *crotolarioides.* Himalayas.
8. *Seed of* Trigonia.

and forming wings to the corolla, give it the appearance of a papilionaceous flower; as the seed-vessel ripens, the two large portions of the calyx lose the blue tint, and become green like the rest, remaining folded at the sides of the heart-shaped pod. The lower petal is keel-shaped, having a crest at the back resembling the fringed petals of mignonette; in some localities the colour of the flowers varies to pink or white. P. *amara* is extremely bitter in its juices: occasionally found in this country; abundant in the turfy, moist meadows of Switzerland. P. *chamæbuxus* (3) is one of the eight species of Germany and the Alps: a yellow flower amidst the prevailing purple or blue colour of this tribe. P. *cordifolia* (2), and P. *speciosa*, are amongst the most beautiful species; many are small and of insignificant aspect; some have heath-like leaves, with minute flowers growing in spikes or clusters. Upwards of 160 species are known to exist in different countries; about fifty are natives of fields or pastures in Brazil. P. *paludosa* is a slender little plant, inhabiting marshes; P. *hispida* is densely clothed with hairs. P. *senega* possesses strong pungent qualities in the contorted woody root — considered by the American Indians as a remedy for the bite of the rattlesnake. Several others are reputed to have valuable medicinal properties: in P. *venenosa* emetic principles exist so powerfully, that the natives of Java dread it as a poison. Thirty kinds belong to India; some have been found on the Khasya and Bhootan mountains at an elevation of 6000 feet; nine grow on the Himalayas, the root of P. *crotolarioides* (7) is there employed against the bite of venomous reptiles, with the same success as the American Snake-root; P. *tinctoria* affords a dye in Arabia. Securidaca (4) is so called from the hatchet-shape of the seed-vessel—the wing extending in a curved form. The leaves of these species vary much; those of S. *nitida* are large and shining; S. *volubilis* has a strong, woody, climbing stem, bearing abundant seed-vessels. Muraltia (5), called after a Swiss botanist of the last century, is a genus of neat foliage and small flowers; M. *ciliaris* is covered with extremely minute horizontal hairs. Mundia *spinosa* (6) bears an eatable fruit of the drupe kind at the Cape. The bark of the roots of Monnina is pounded into balls, and used as soap in Peru; and the celebrated silver-work of Huanuco is polished by it. Trigonia (8) is an example of the seed having long hairs; T. *macrocarpa*, on the Esequibo, has capsules three inches long. Xanthophyllum yields wood of value. Although nearly all the plants of this Tribe are bitter, Soulamea *amara*, of the Moluccas, is most intensely so, and is employed as a remedy in fever throughout the Malayan Archipelago.

Most of the plants of this Tribe are limited to one or two of the great portions of the globe; but Polygala occurs in Europe, Asia, Africa, and America, very unequally distributed, inhabiting every description of situation—plains, mountains, woods, morasses, cultivated or barren ground, in the tropics and in temperate climates. Muraltia belongs to South Africa, Salomonia to Asia, Monnina to South America, Soulamea to India and China, Comesperma to Brazil and Australia.

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Mignonette.

RESEDACEÆ.

THE MIGNONETTE TRIBE.

Soft herbaceous plants, and a very few shrubs; the leaves alternate, entire, or divided, with minute gland-like stipules; sometimes rough, with very small tubercles on the surface and at the edges. The flowers grow in racemes or spikes, the flower-stalks have small bracts at their base; the calyx is parted into four or six segments, which are not closed in the bud. The petals are four or six, alternate with the sepals, or absent; each petal has a broad fleshy plate at the base, with slender unequal fringes proceeding from the back, like the sepals not closed in the bud: those next the stem are larger than the rest, the lower petal sometimes altogether wanting. The pistil and stamens are placed at the edge of a large disk, spreading at the back, glandular on its surface; the stamens are from ten to twenty, the anthers two-celled, opening lengthwise. The stigmas are three, glandular, placed at the top of the three-lobed ovary. The seed-vessel is dry and membranous, or succulent in Ochradenus, opening at the top, usually having the seeds attached to three ridges: the seeds are kidney-shaped, pendulous, arranged in a double series or scattered, white or brown, without albumen; the covering crustaceous and dotted.

This Order has most affinity with the Caper tribe; there is also some resemblance to Polygalaceæ.

The only remarkable properties of these plants are the colouring matter of the Weld, and the fragrance of the Mignonette.

Reseda is said to have been so named by the Romans from its supposed soothing properties in allaying pain. Reseda *luteola* (1) is very common in many parts of England, especially on a chalk soil, frequent in fallow fields, on walls, and on waste ground of various kinds; it is observed to be one of the first plants that spring up amongst the rubbish cast out of coal-pits. It grows to the height of

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1. Reseda *luteola, Dyers'-weed, or Weld.* England.
   - 1A *Flower, front.*
   - 1B *Flower, side.*
   - 1C *Seed-vessel, opened.*
2. Reseda *lutea, Wild Mignonette.* England.
   - 2A *Flower, front.*
   - 2B *Flower, back.*
   - 2C *Upper Petal.*
   - 2D *Side Petal.*
   - 2E *Disk with Stamens and Pistil.*
   - 2F *Stamens.*
   - 2G *Pistil.*
   - 2H *Section of Seed-vessel.*
   - 2I *Seed.*
3. Reseda *odorata, Mignonette.* Egypt.
   - 3A *Flower, magnified.*
   - 3B *Upper Petal.*
   - 3C *Side Petal.*
   - 3D *Seed-vessel, opened.*
   - 3E *Seed.*

two or three feet, in slender branches, nearly upright; but Linnæus remarked that they incline towards the sun throughout the day, bending northwards by night. The flowers have scarcely any scent, and the plant when bruised is disagreeable; the seed-vessel is of a rounder shape than that of other species, and on a shorter stalk. The whole plant yields a fine yellow dye—obtained by boiling whilst in flower. It serves for wool, cotton, or silk, either as pure yellow, or mixed with indigo for green: in France this is much used—large bales of *Gaude* may be seen on the quay at Caen in summer or autumn. R. *lutea* (2) is also an inhabitant of chalk soil, abundant in the Isle of Thanet and other similar districts. The spike of flowers very nearly resembles that of R. *odorata* (3), but is very slightly scented; the sepals and petals are six; the narrow curled leaves are often much divided near the root. R. *odorata* is a native of Egypt, whence it was brought through France, with its French name *Mignonette*, to England, about a century ago. No other little plant was ever so rapidly dispersed, or acquired such general favour, without utility, but merely for the delightful odoriferous scent of its flowers, which is of extreme subtilty, and conveyed by the air to some distance. With continual clipping the plant may be rendered perennial, and even shrubby. In France, where it is cultivated to a great extent, the Parisians are remarkably fond of it, and until late in autumn the gardens of the Tuileries are perfumed with its delicious fragrance. R. *phyteuma* is an esculent herb in the Greek Archipelago. R. *scoparia* is a species growing on the Peak of Teneriffe. R. *dipetala* belongs to the Cape of Good Hope. One species, with a dense spike of white flowers, has been found in Affghanistan, and some also are said to have been seen in the southern provinces of Canton. Caylusea is a genus growing in Brazil, discovered by Auguste de S. Hilaire, at present unknown in English gardens.

Europe is the chief station of this Tribe; some species extend into the islands of the Mediterranean, and the neighbouring countries of Asia; a very few have been discovered in the north of India, the Cape of Good Hope, and California.

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Day & Son Lith.

DROSERACEÆ.

THE SUN-DEW TRIBE.

Herbaceous plants, some of which are small, and covered with glandular hairs. The leaves are alternate, having sometimes fringed stipules at the base of the leaf-stalk; the stalks are curled round in the early state of growth. The flower-stalks spring from the root, and are likewise curled round when young, after the manner of Ferns; the calyx has five sepals, which remain, and enclose the seed-vessel; the petals are five, attached to the base of the ovary, folded over each other in the bud. The stamens are distinct, either equal in number to the petals and alternate with them, or two or three times as many; the anthers are erect, gaping by chinks, or by pores at the top, as in Byblis (3). The ovary is single, the styles three or six, either quite separate or slightly connected at the base. The seed-vessel is a capsule, of three or five valves, bearing the seeds on ribs in the middle, or at the base. The seeds are naked, or furnished with an aril, and contain fleshy albumen.

This Order has affinity with Violaceæ, but the number of styles, and the rolled-in stalks, distinguish them.

Slightly acrid and acid properties prevail in these plants.

Drosera is so named from the Greek for *dew*, because of the pellucid drops which are almost constantly present on the glandular hairs of the leaves, even when exposed to the sun. All the species inhabit morasses or bogs. D. *rotundifolia* (1) is a native of bogs in various parts of Britain, and on the continent of Europe; it is usually found amidst Sphagnum, the Bog-moss, in a soft, moist situation: the whole plant has acrid, caustic juices, pervading even the viscid liquid exuding from the glands of the hairs. Flies and other small insects are attracted to the leaves, where they are detained by the irritable, glutinous hairs. The delicate little flowers open singly, and but for a short time. D. *longifolia* is often found

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1. Drosera *rotundifolia*, *Round-leaved Sun-dew.* Bogs, Britain.
   - 1A *Flower.*
   - 1B *Section of Ovary, and Pistil.*
2. Dionea *muscipula*, *Venus's Fly-trap.* Carolina.
   - 2A *Pistil.*
   - 2B *Section of Ovary.*
   - 2C *Seed.*
   - 2D *Section.*
3. Byblis *liniflora*, *Flax-flowered Byblis.* New Holland.
   - 3A *Sepal magnified.*
   - 3B *Stamen.*
   - 3C *Pistil.*
   - 3D *Section of Ovary.*
   - 3E *Seed.*
4. Aldrovanda *vesiculosa*, *Bladder-leaved Aldrovanda.* Italy and India.
   - 4A *Leaf, with its vesicle.*

in the same localities. D. *anglica* is a larger plant, more rare, and grows chiefly in the bogs of the north of England. Britain contains only a very small portion of this singular tribe of plants, which, though limited to a few genera, is yet greatly multiplied in species of Drosera. Nearly every region of the world where bogs exist has a representative of it. In South America they abound. Some are of extremely minute size, scarcely an inch in height, of which are D. *uniflora*, D. *minima*, D. *pauciflora*. D. *brevifolia*, of Texas and Florida, nearly resembles our round-leaved Sun-dew, but the flowers are larger. D. *cistifolius* of Florida has red and yellow flowers. D. *villosa* is a native of Sphagnum bogs on the Organ Mountain, near Rio Janeiro, at an elevation of from 3000 to 6000 feet. D. *sessilifolia*, D. *montana*, and several other species, grow in Brazil, either on the sands of the coast, or in ravines, or damp valleys of the rivers of Minas Geraes, and on mountain bogs and marshes 3700 feet above the sea. D. *graminifolia* inhabits the lofty range of mountains called Serra da Caraça, at 6000 feet, producing its delicate flowers in February. D. *ethiopica* is a small African species, with many leaves disposed in a circle about the root. D. *capensis* has long stalks, with leaves two inches long. D. *indica* has beautiful pink flowers, and leaves very minutely pinnated. D. *aurea* is a small species found at Port Jackson in Australia. D. *secunda* and D. *pulchella* were discovered in King George's Sound; D. *tomentosa* grows on the north coast. The largest species are D. *dichotoma* and D. *gigantea*. This latter stains paper a bright deep purple, and, when prepared with ammonia, yields a clear yellow. Probably several of the Swan River species might be of use in dyeing. Dionea (2) is a remarkable instance of an irregularly developed leaf; the stalk is winged, and has the appearance of a leaf, whilst the real leaf consists of a double plate, which folds together when touched, bordered by strong teeth, closing firmly to retain any insect that has been attracted by the glutinous juice on the surface of the leaf or hairs. Byblis (3) was named after the daughter of Miletus, who shed tears till she was changed into a fountain; the slender leaves of this delicate little bog plant distilling drops of water from their points. It was brought from New South Wales early in this century, and cultivated in the noble garden at Cashiobury, where, at that time, was the finest collection of Australian plants. The flowers resemble those of flax in form and colour. The blue anthers open by pores at the summit. Each cell of the seed-vessel contains many seeds. Aldrovanda (4) was first observed by the naturalist Amadeus in the marshes of Dulioli, in Italy; but he went to reside in Bologna, and had no further opportunity of observing marsh plants. It was afterwards carefully examined and described by Aldrovandus. The flowers are minute, and appear only in small number at the ends of the branches. Like many aquatic plants, it propagates by buds from the stalk, which send out rootlets. The remarkable part is the little folded vesicle at the end of the leaves, which enables the plant to float. It has the property of staining paper red, showing the whole form of the plant, like the Lichen Roccella, or Orchil.

This Tribe inhabits marshes, bogs, and morasses, in all parts of the world. Drosophyllum *lusitanicum* grows on the barren sands of Portugal.

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OXALIDACEÆ:

THE WOOD-SORREL TRIBE.

Trees, under-shrubs, and herbaceous plants; the leaves are alternate, occasionally opposite, rarely having stipules; the roots of some are tuberculate or granulate. The sepals of the calyx are five, sometimes slightly cohering at the base, persistent, imbricated: the petals are five, of equal size, attached to the base of the ovary, having a claw at the base; spirally twisted in the bud, sometimes wanting. The stamens are ten, usually more or less united in a set at the base; those opposite the petals are longer than the rest, and form an inner series; the anthers are two-celled. The ovary has three to five cells, with as many slender styles; the stigmas are capitate, or somewhat bifid. The fruit is a capsule, rarely a berry, with five angles, and from three to five cells, and five to ten valves; when ripe, gaping longitudinally at the angles. The seeds are few, attached to the axis, or to plates in the angles of the cells; striated when young, enclosed in a fleshy covering, which curls back with elastic force when ripe, and expels the seeds. The seeds contain a tough, fleshy albumen.

This Order has considerable affinity with the Flax tribe, and also with Geraniaceæ.

Oxalic acid exists abundantly in these plants, as well as slightly astringent properties.

The genus now called Oxalis is not supposed to be the same as that known to the ancients; it includes numerous species, chiefly of slender, delicate growth: some have small bulbous or scaly roots, from which spring the slender leaf and flower-stalks. The delicate Oxalis *acetosella* (1) comes forth early in the year, adorning the still bare woods of this country, as well as on the continent of Europe, with its very graceful leaves and flowers. Several species have been observed to have sensitive properties in the leaves, and those of our Wood-Sorrel may be seen to close and droop at sunset, and to expand again into a horizontal position in the morning. The capsules possess also elastic power, and project the black shining seeds to a distance on the slightest touch, when ripe. Formerly this

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1. Oxalis *acetosella, Wood-Sorrel.* England.
   1A *Petal.*
2. Oxalis *floribunda, Many-flowered Oxalis.* Brazil.
   2A *Stamens and Pistil.*
3. Averrhoa *Carambola, Carambola Fruit.* East Indies.
   4A Oxalis *confertissima.*
   Stamens and Pistils.
   4B *Pistils.*
   4C *Seed.*
   4D *Section.*

herb was used by thrifty dames for a conserve with sugar, and considered pleasant and wholesome from its acidity. O. *corniculata* is the other British species, the flowers of which are yellow, and the capsule of a more slender oblong form. O. *floribunda* (2) is an example of those species which bear several flowers on a kind of umbel, and have tuberous roots. O. *crenata* of Columbia has tubers as large as a potatoe, called by the natives *Arracacha;* being of a very insipid nature, they are not cultivated: all the agreeable acid qualities are absorbed by the leaf-stalks, which are conserved. The larger tubers of O. *Deppei* are fleshy, and contain a starchy substance similar to salep in the root of some species of Orchis; these are used for culinary purposes. O. *esculenta* and others are said to be equally wholesome as food. Some few species have palmated leaves; others winged leaf-stalks. The Cape of Good Hope is the chief station for Oxalis. Averrhoa was named in honour of Averrhoes, the celebrated Spanish commentator on Aristotle and Avicenna, in the early part of the thirteenth century. The fruit of A. *Carambola* (3) is eatable, although of not very agreeable flavour to Europeans; the five projecting angles of the fruit are singular, and distinguish it from all others. The branches and leaves have remarkable sensitiveness to the touch. A. *Bilimbi*, the Cucumber-tree of Goa, is much cultivated in India, especially on the banks of the Ganges. The flowers yield a juice of cooling qualities, which render it excellent in fevers; there is likewise a large proportion of pleasant acid juice in the fruit, very wholesome as food. Both these fruits are said to be employed by the natives in dyeing. Biophytum, or the Plant of Life, alludes in its name to the exceeding irritability of the pinnated leaves, which move on the least motion or touch; they are said to possess also bitter, tonic, and slightly stimulating properties.

These plants are natives of all the temperate and hotter countries of the world, but exist most abundantly at the Cape of Good Hope and in America; are more rare in the East Indies and in the equinoctial regions of Africa. The shrubs are confined to the hotter countries; a few of the herbaceous species are scattered over the temperate parts of Asia, and in Europe.

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PITTOSPORACEÆ.

THE PITTOSPORUM TRIBE.

Trees and shrubs, the leaves of which are simple, alternate, without stipules, usually entire at the edges, sometimes serrated. The flowers are at the ends of the branches, or proceed from the base of the leaf-stalks, imbricated in the bud. The sepals of the calyx are four or five, either distinct or partially cohering, falling off when the flower expands. The petals are four or five, attached to the base of the ovary, sometimes slightly cohering. The stamens are five, growing from the base of the ovary, alternate with the petals. The anthers are two-celled, opening longitudinally or by a pore. The ovary is single, distinct, having two or more cells, in which are many seeds; the style is single, the stigmas equal in number to the plates on which the seeds are affixed. The fruit is a capsule or a berry, with many-seeded cells, which are sometimes incomplete. The seeds are often covered with a pulp of a glutinous or resinous nature, and contains a large proportion of albumen.

This Order has some points of resemblance to Polygalaceæ and Frankeniaceæ, and in Cheiranthera is shown an affinity with Dilleniaceæ.

A slightly fragrant resin in the bark and seeds, and a bitter, acid taste, are the chief properties of these plants.

Pittosporum was named from the Greek for *resin* and *seed*, in allusion to the resinous pulp of the capsule usually investing the seeds. P. *Tobira* (1) is a shrub with fine glossy foliage and pleasantly fragrant flowers, sufficiently hardy to bear the English climate, consequently an agreeable addition to our shrubberies; the bark contains a portion of resin. P. *viridiflorum* and a few other species are of nearly similar aspect.

Billardiera, so called after La Billardière, a celebrated French botanist who travelled in Syria and afterwards in New Holland: several species have been

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1. Pittosporum *Tobira*, *Glossy-leaved Pittosporum.* China.
   - 1A *Stamen.*
   - 1B *Ovary and Pistil.*
   - 1C *Section of Ovary.*
   - 1D *Seed.*
2. Billardiera *linearis*, *Slender-leaved Apple-berry.* Swan River.
   - 2A *Stamen and Pistil.*
   - 2B *Pistil.*
   - 2C *Section of Fruit.*
   - 2D *Seed.*
3. Bursaria *spinosa*, *Thorny Bursaria.* New South Wales.
   - 3A *Seed-vessel.*
   - 3B *Seed.*
4. Cheiranthera *linearis.* Australia.
   - 4A *Stamens and Pistil.*
   - 4B *Section of Fruit.*

introduced from thence, all of elegant form and climbing habit of growth: the pendent blue flowers of some are extremely beautiful. The most abundant blossoms are produced on the graceful B. *linearis* (2); their bright colour, and the slender foliage, render it one of the favourite shrubs of the conservatory. B. *longiflora* of Tasmania has solitary flowers with greenish petals; the berries are of a long shape, and become blue when ripe, and, hanging in drooping clusters, have an extremely pleasing appearance. The reason of these plants having been called apple-berry is not obvious, as there is no resemblance in form or colour, neither is the flavour of the fruit the same. The berry of B. *mutabilis* is said to be eatable, but the numerous hard seeds fill up a large portion of the interior, and leave very little pulp.

Bursaria differs from the rest of this Tribe in the form of the seed-vessel, which, as the name records, is that of a pouch; when first discovered with the capsules ripe, it was supposed to belong to the cruciferous group of plants. B. *spinosa* (3) is an ornamental shrub, three or four feet in height, bearing profusely its delicate white flowers.

Cheiranthera (4) is a singular little plant with very fine heath-like leaves; the arrangement of the six stamens on one side of the ovary and pistil forms a curious link with some genera in the Dillenia Tribe. Citriobatus is a genus inhabiting New Holland.

The plants of this Tribe belong chiefly to Australia, a few only are natives of Africa and the neighbouring islands; one species has been discovered in Nepal. Pittosporum is the most extensively dispersed, being found in New Holland, New Zealand, Norfolk Island, the isles of the Pacific Ocean, the Moluccas, China, Japan, and Madeira; none have been yet found in America, and they are entirely unknown in Europe.

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LINACEÆ.

THE FLAX TRIBE.

Annual and perennial herbaceous plants, and a few small shrubs. The leaves are either alternate or opposite, rarely growing in whorls, simple, entire, and without stipules, sometimes with a pair of glands. The calyx is composed of three, four, or five sepals, continuous with the flower-stalk, and remaining after the petals are fallen off; the petals are of the same number as the sepals, have a claw at their base, and are twisted in the bud state. The stamens are placed alternately with the petals, and are united at their base in a ring, from which proceed small teeth opposite to the petals, indicating imperfect stamens; the anthers are ovate; the ovary has about as many cells as sepals, seldom fewer; the styles equal the number of the cells, and have round-headed stigmas; the capsule is generally pointed with the hardened base of the styles, and opens by two valves from the top; it contains many cells, completely or partially divided by an imperfect partition, each cell has a single compressed polished seed within.

The chief characters of the Flax tribe are the tenacity of the fibre, the oil of the seed, and the mucilage of its covering.

Linum derives its name from the old Celtic word *Llin*, signifying thread; the tenacious and delicate fibre of Linum *usitatissimum* (1) is well known as Flax, and has been cultivated and made into linen from the most remote antiquity. In Egypt flax-seed was sown on land annually inundated by the waters of the Nile, which was very favourable for its growth; linen was made and used plentifully by the ancient Egyptians; the wrappings of mummies have been ascertained to be invariably of linen cloth. The Hebrews were early acquainted with the art of making fine linen. Flax is cultivated throughout India, but the natives prefer Hibiscus *cannabinus* and other plants, for the sake of the fibrous thread, employing only the mucilage and oil of the seeds of Linum. The period of the introduction of Flax into Britain is unknown, but it is now become indigenous, and is grown to some extent in Ireland. After it is pulled, and has been steeped in water during several days, the fibrous part separates from the stalk; it is then dried in the sun before being further prepared for use: the water

1. Linum *usitatissimum, Common Flax.* England.
   1a *Capsule.*
2. Linum *Africanum, African Flax.* Cape of Good Hope.
3. Linum *trigynum, Three-styled Flax.* East India.
4. Radiola *millegrana, Allseed.* England.
   4a *Flower magnified.*

in which Flax has been soaked is rendered injurious to cattle, on which account the practice of steeping it in any running stream or common pond was forbidden by Act of Parliament in the reign of Henry VIII. The fibres of Flax are spun and wrought into the strongest kind of linen, and are also capable of extreme attenuation for the most delicate cambric: at Cambrai in France, where the art of manufacturing fine cambric was first practised, it is still the custom to weave it in damp cellars, in order to prevent the breaking of the slender thread, which would occur in a dry atmosphere. The seeds yield by pressure a valuable oil, which is much used in painting and varnishing, and also in medicine; the mucilaginous portion that remains affords a very nutritious food for cattle.

Linum *selaginoides* is considered medicinal in Peru, and Linum *catharticum*, a native of Britain, with small white flowers, is also used in medicine.

Linum *perenne* and other species are ornamental in gardens; the flowers of all are fugitive, but generally of bright colour and delicate texture.

Radiola *millegrana*, *allseed* (4), is a small plant occasionally found on commons where the turf has been pared off, as on Esher Common, Surrey; its slender stem is repeatedly forked, having small ovate leaves in pairs; the minute white flowers grow from the divisions and the tops of the branches.

The principal portion of this Tribe is found in Europe and the North of Africa, but a few species are scattered more or less over most parts of the world. Several are natives of North and South America, a few belong to the mountains of India, one is known in New Zealand, none have yet been discovered in New Holland; the most northern limit of the tribe is at 54° N. lat. in North America.

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CISTACEÆ.

THE ROCK-ROSE TRIBE.

Shrubs, undershrubs, and herbaceous plants; the branches often covered with a glutinous substance; the leaves usually entire, sometimes toothed at the edges, opposite or alternate, having stipules or without them. The flowers are very fugacious, lasting only during the early hours of the day. The calyx is composed of five permanent sepals, usually of unequal size, the two outer being generally much smaller than the rest, often nearly wanting; the larger sepals are twisted in the bud, almost always clothed with a viscid secretion, or with hairs growing either in pairs or in clusters. The petals are five, crumpled in the bud, and twisted in a contrary direction to the sepals. The stamens are numerous, the anthers minute, ovate, two-celled, opening longitudinally. The style is long and slender, or short and thick, with a simple stigma. The seed-vessel is a capsule, three, five, or rarely ten valved, one-celled, or rendered many-celled by the partitions from the middle of each valve projecting to the centre.

This Order has affinity with Violaceæ, but differs in the indefinite number of the stamens; it agrees also with Bixaceæ in many points, but the leaves have no pellucid dots, and the seeds contain farinaceous albumen.

The only remarkable property is the resinous balsamic substance Labdanum, which exudes from some of the plants.

Several species of Cistus and Helianthemum are highly esteemed as ornamental plants in gardens; some are upright shrubs, others small trailing plants, growing particularly well among rocks and stones; the brilliant, though ephemeral flowers expanding in succession during several weeks of summer. Cistus *cyprius* (1), one of the most beautiful of the tribe, is extremely glutinous on the branches, leaves, and calyx; but C. *creticus*, C. *ledon*, and C. *ladaniferus*, yield the supply of

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1. Cistus *cyprius*, *Gum Cistus*, or *Rock-rose*. Spain.
   - 1A *Stamen magnified.*
   - 1B *Pistil.*
   - 1C *Sepal magnified.*
   - 1D *Ovary.*
   - 1E *Cross section.*
2. Helianthemum *polifolium*, *White mountain Sun Cistus*. Devonshire.
   - 2A *Pistil.*
   - 2B *Stamen magnified.*
   - 2C *Hairs magnified.*
3. Helianthemum *vulgare*, *Common Sun Cistus*. Britain.
   - 3A *Seed-vessel open.*
   - 3B *Seed magnified.*
   - 3C *Hairs magnified.*
4. Helianthemum *formosum*, *Beautiful Sun Cistus*. Portugal.
5. Helianthemum *rhodanthum*, *Rose-coloured Sun Cistus*. Spain.
6. Helianthemum *canescens*, *Hoary Sun Cistus*. South Europe.

Labdanum, which is collected by drawing long straps of leather over the shrubs; it is then scraped off and made into lumps of various sizes, in which state it comes from the Levant and countries bordering on the Persian Gulf. Its principal use is as an ingredient in fumigations, on account of its fragrance in burning. C. *candidissimus* belongs to the Canaries; C. *vaginatus*, with pale, rose-coloured flowers and large leaves, is a native of Teneriffe; these are consequently on the outer limits of the geographical distribution of the Tribe in that direction. C. *salvifolius* inhabits the island of Corfu. Helianthemum *polifolium* (2) is a rare species, found chiefly on hills and downs in the south of Devonshire, and occasionally on the Continent; in habit it resembles the Heaths, the lower part of the procumbent half-shrubby stem being much branched and destitute of leaves. H. *vulgare* (3) is frequent in hilly, open places, on a chalky or gravelly soil; it is found also as far north as the Highlands of Scotland, adorning the wild moors with its fragile yellow flowers. Several garden varieties have been produced by culture. H. *tomentosum*, a very downy species, belongs to the mountains of Scotland and Switzerland. H. *alpestre* attains the limits of perpetual snow on the Alps, and has the usual character of Alpine plants—shrubby, hairy, and not rising far above the ground. H. *arabicum* is scattered over Arabia, Barbary, and South Europe. A few species are natives of North America, and have the peculiar property of bearing flowers without petals in the autumn. H. *canadense* grows in Mexico: H. *corymbosum* is found from New Jersey to Carolina: H. *rosmarinifolium* in Georgia and Canada. H. *brasiliense* is one of the very few belonging to South America. Lechea is a North American genus, five species of which have been introduced to English gardens. Hudsonia *tomentosa* is another half-shrubby plant of North America, growing in dense silvery tufts, about a span high, on the drift sands of the Atlantic Ocean, in Delaware, and Maryland; the flowers are small and yellow, having all the essential characters of the Tribe, but none of its peculiar beauty; in size and form it resembles Lechea. H. *ericoides* grows with a heath-like habit in the pine-woods of Canada.

The central situation of this Tribe will be found in Spain and Portugal; upwards of forty species are natives of the Pyrenees and other mountains; thence they diminish in every direction; a few extend into North Africa; they are rare in North America, still more uncommon in South America, and scarcely known in Asia. Britain possesses no true Cistus, only six species of Helianthemum.

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MALVACEÆ.

THE MALLOW TRIBE.

Trees, shrubs, and herbaceous plants. The leaves are alternate, more or less divided, and have stipules at the base of their stalks. The flowers grow generally from the base of the leaf-stalks, and are often surrounded by an involucre of various forms. The sepals of the calyx are five, very seldom three, or four, in a greater or less degree united at the base. The petals are of the same number as the sepals, twisted in the bud, either distinct or adhering to the tube formed by the stamens. The stamens are numerous, all perfect, the filaments united together by the base of the pistil; the anthers are one-celled, bursting transversely. The ovary is formed by the union of several carpels or seed-vessels around a centre, from which arise an equal number of styles, either united or distinct, with variable stigmas. The fruit is either a capsule, as in Hibiscus, or a berry, as in Achania; the seed-vessels are united, as in Malva; or distinct, but crowded into a heap, as in Malope: each contains one or more seeds, which are sometimes hairy, as those of Gossypium.

The united stamens of Malva connect this Order with Geraniaceæ; the twisted petals and mucilaginous properties with Flax; and the arrangement of the carpels of Malope has an affinity with the crowfoots.

The uniform character of the whole Order is to abound in mucilage, and to be destitute of all unwholesome properties. It is remarkable for the beauty of the flowers, for the toughness of the fibres, which in many species yield a strong cordage, and a thread used for weaving into coarse linen, for the downy cotton in the seed-vessels of some species, for the softening mucilage prepared from the seeds and roots of others, and for various useful properties.

Malva *moschata* (1) is the prettiest of the British species of this tribe; it was named from a slight scent it possesses of musk. Malva *sylvestris* is well known as one of our commonest way-side flowers, and is a good example of one species being very widely dispersed beyond the usual limits of the tribe; this and the

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1. Malva *moschata, Musk Mallow.* England.
2. Gossypium *herbaceum, Common Cotton.* East Indies.

2A *Seed.*

3. Hibiscus *syriacus, Althea frutex.* Syria.
4. Malope *trifida, Trifid-leaved Malope.* Barbary.

4A *Fruit of distinct carpels crowded into a heap.*

5. Hibiscus *Rosa-sinensis, Chinese Hibiscus.* China.
6. Abutilon *striatum, Striated Abutilon.* Brazil.
7. *Fruit of* Malva *sylvestris, Common Mallow.*

British M. *rotundifolia* are frequently seen on the plains of India. M. *crispa*, of the West Indies, yields from the bark a very tenacious fibre for cordage. Gossypium, the cotton plant, is the most extensively useful of this or perhaps any tribe; there is scarcely any other plant that has proved of so much service to man, or has called forth so high a degree of skill in manufacture, or enterprise in commerce. It appears to have been first cultivated and woven into cloth in India, but is now spread over an extensive range of the globe on each side of the equator; from the south shores of Europe to the Cape of Good Hope; from China to Arabia and Syria; one species is peculiar to Peru; several are cultivated in the West Indies, Mexico, and the United States. In the equinoctial regions of America, cotton grows at an elevation of 9000 feet. Gossypium *herbaceum* (2) and its varieties are the kinds most generally cultivated in India; the capsule contains about five seeds, covered with a short grey down, lying in the mass of white cotton. One of these varieties produces the delicate cotton from which the beautiful Dacca muslin is fabricated. G. *herbaceum* is the only kind grown in the south of Europe. Hibiscus *Rosa-sinensis* (5) is a splendid example of the beauty of the flowers of this tribe; the petals are, like some others, astringent; the juice is used by the Chinese to blacken their eye-brows and the leather of their slippers. H. *cannabinus* is employed in India as a substitute for hemp and flax; the seeds yield an useful oil. H. *trionum*, with its inflated membranous calyx, is known in gardens as the *Bladder Ketmia*. Althea *frutex* (3) is a hardy shrub, flowering abundantly in shrubberies, even in the Parks of London. A. *palustris* inhabits the marshes of our southern coast, and is also found plentifully in France, where a syrup under the name of *guimauve* is obtained from the abundant mucilage of the roots, and is esteemed as a cure for coughs. A. *rosea*, the Hollyhock, affords a similar kind of syrup in Greece; its leaves yield a yellow dye. Abelmoschus *esculentus* is an excellent ingredient for soup in the East. The seeds of A. *moschatus* are cordial, and mixed with coffee by Arabians. Urena and Pavonia are both medicinal plants of Brazil. Abutilon, Sida, and a few other genera, compose a division of this tribe without an involucre to the flower. Abutilon *striatum* (6) is a highly ornamental shrub, producing its elegant bell-shaped flowers on long drooping stalks during several months. Sida *lanceolata* is intensely bitter, and is thought valuable in medicine. S. *micrantha* has extremely straight light stems, which serve well for rocket-sticks.

The plants of this Tribe are found in great abundance in the Tropics: plentifully in the hottest countries of the Temperate regions, gradually diminishing towards the north. In the British Isles there are only six species; in Sweden they form but a small portion of the Flora; in Lapland they seem to be altogether unknown.

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Edit.

Tropaeolaceae

The Indian Cress or Nasturtium Tribe

Pl. 8. Syn. Iss.

TROPÆOLACEÆ.

THE INDIAN CRESS, OR NASTURTIUM TRIBE.

Smooth herbaceous plants, of tender succulent nature, trailing or twining, having an acrid taste. The leaves are alternate, without stipules, stalked, sometimes shield-shaped. The flower-stalks grow from the base of the leaf-stalks, and bear each one flower; the prevailing colour is orange. The sepals of the calyx are from three to five, the upper one having a long spur, distinct or connected at the base, sometimes coloured, in the bud they are usually closed in a valvular form, or are very slightly folded over. The petals are from one to five, of equal or unequal size, convolute in the bud, sometimes partially undeveloped, as in Tropæolum *umbellatum* (3); the stamens are from six to ten, inserted into the calyx, distinct, the anthers are two-celled. The ovary is simple, three-cornered, composed of three or five carpels. The style is simple, the stigmas three or five, acute; the three parts of the fruit separate from the common axis, sometimes they are winged; the seeds are large, filling the whole carpel, without albumen.

This Order has affinity with the Mallow tribe, and is connected by many resemblances with Geraniaceæ, but the spur of Pelargonium is united to the flower-stalk.

An acrid property prevails in the leaves and fruit of these plants.

The flower of Tropæolum is supposed to resemble a helmet, and the leaf has in some species the form of a buckler, from which the idea of a trophy was derived, and the Latin name composed. T. *majus* (1) is one of the most ornamental and hardy of the plants introduced from Peru, and is a very general favourite in gardens; the flowers, as well as the fleshy fruit, have a peculiar strong flavour, and are often eaten in salads or pickles. It is remarkable that this is the only plant besides those of the Cruciferous tribe on which the caterpillar of the Cabbage Butterfly feeds; this indicates the existence of similar properties to a certain extent. From the similarity of the flavour to that of Cress T. *minus* the first species intro-

1. Tropæolum *majus, Great Nasturtium.* Peru.
   - 1A *Calyx.*
   - 1B *Stamens and Pistil.*
   - 1C *Capsule.*
   - 1D *Carpel and Ovule.*
2. Tropæolum *peregrinum, Fringed Canary-Flower.* Peru.
   - 2A *Calyx and two Petals.*
   - 2B *Ovary and Pistil.*
3. Tropæolum *umbellatum, Umbelled-flowered Tropæolum.* Peru.
   - 3A *Flower.*
4. Tropæolum *azureum, Blue-flowered Tropæolum.* Chile.
5. Tropæolum *edule.* Peru.
6. Limnanthes *Douglassii.* California.

duced to Europe was named Nasturtium, after the water-cress: it was discovered by the Spaniards in Peru, and then followed the usual track in that time, first carried to Spain in the early part of the sixteenth century, thence transported to the gardens of Henri IV., in Paris, and afterwards sent over to England by the royal gardener Robin to his friend Gerard, who first cultivated this "rare and faire plant" in his garden, and called it "Cresses of India." The daughter of Linnæus observed the property possessed by Tropæolum of emitting sparks in the twilight of midsummer morning and evening. T. *tuberosum* has an eatable tuberous root partly resembling the potato; on the slopes of the Andes, near Santiago, it is cultivated in large fields. T. *edule* (5) has a root of the same nature. T. *peregrinum* (2) was found by the Spaniards, a common climbing plant, in the gardens of Lima and other cities of Peru; they named it *Paxaritos amarillos* (yellow birds), and it is here frequently called Canary-flower, from the colour and remarkable shape of the flower when partially expanded; it was first brought over in 1775, but has only of late years been generally grown in gardens, having become perfectly hardy in our climate. T. *azureum* (4) is a singular example of a blue flower amongst a red and orange group. In T. *umbellatum* (3) the two petals attached to the spur are extremely minute. T. *polyphyllum* is a native of the Andes of Chile, near Mendoza. Magallana *porifolia* records the name of Ferdinand Magallan; in manner of growth and appearance, it closely resembles Tropæolum, the smooth round stems climbing and twining about; the leaves are in three slender divisions, and have numerous small pores; the remarkable part of the plant is the seed, which has three wide wings. Chymocarpus has a fleshy capsule. Limnanthes (6) is an annual plant, the name derived from the Greek for *lake* and *flower*, in allusion to its place of growth; the parts of fructification vary a little from those of Tropæolum, and by some botanists it has been made the origin of a new Order, but the properties are precisely similar.

All these plants are natives of the Temperate regions of North and South America.

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BYTTNERIACEÆ.

THE BYTTNERIA TRIBE.

Trees, shrubs, and undershrubs, occasionally of a climbing nature, usually clothed with stellate or forked hairs. The leaves are alternate, simple, sometimes notched at the edges, occasionally having stipules which soon fall off. The flowers grow in clusters, spikes, or panicles. The calyx is herbaceous, membranous, or leathery, four or five-lobed. The petals are of the same number as the lobes of the calyx, twisted in the bud and flat, or arched and hollowed at the base, and lengthened at the point; either permanent or deciduous, often adhering to the tube of the stamens. In Lasiopetalum and others the sepals have the appearance of petals, and the petals are either minute scales, or wanting. The stamens are opposite the petals, sometimes imperfect stamens are placed between them, almost always united into a cup or tube; the anthers are turned inwards, two-celled, opening lengthwise, very rarely by a pore or cleft near the point. The ovary is free, sessile, or on a short stalk, composed of four to ten carpels arranged round a central column, or reduced to one only. The styles are terminal, consolidated; the stigmas equal in number to the cells. The fruit is generally a capsule, splitting when ripe through the cells, or separating at the partitions; the seeds are sometimes winged, as in Pterospermum, containing always a small quantity of fleshy or mucilaginous albumen. The fibrous bark and mucilaginous properties of some plants in this Order, connect it with the Mallow and the Linden tribes.

Byttneria (1) was named after Büttner, Professor of Botany at Göttingen in the last century. B. *microphylla* is remarkable for the prickly stipules at the base of the leaf-stalks. The most important tree of this tribe is Theobroma (2), so called by the Spaniards on their discovering its excellent qualities; large forests of it occur in South America, particularly in the hot damp valleys of Demerara, where it is one of the most verdant of the trees. It attains about sixteen feet in height, and bears flowers, fruit, and leaves throughout the year; so vigorous is its power of vegetation, that flowers spring out of the woody roots whenever they are uncovered by earth. The flowers are of singularly elegant shape, the

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1. Byttneria *catalpæfolia*, *Catalpa-leaved Byttneria.* Caraccas.
   - 1A *Stamens and Nectaries.*
   - 1B *Pistil.*
   - 1C *Petals.*
2. Theobroma *Cacao*, *Chocolate Nut Tree.* South America.
   - 2A *Nectaries, Stamens, and a Petal.*
   - 2B *Pistil.*
   - 2C *Stamen.*
   - 2D *Seed.*
3. Lasiopetalum *grandiflorum*, *Large-flowered Lasiopetalum.* Australia.

petals form a hollow at the base in which the anther is concealed, the elongated point of the petals being bent upwards. The large fruit is full of a creamy pulp, in which are about twenty-five seeds; these when ground are made into cocoa, or chocolate, a favourite Mexican beverage, much esteemed in all parts of South America and the West Indies for its nourishing properties, simple mode of preparation, and facility of conveyance; peculiarly valuable to travellers, whether on the extensive table-lands of the Andes, or in the vast uninhabited forests of Central America. An immense quantity is sent to Spain, where it is the daily food of all classes. Bubroma or Guazuma *ulmifolia* is a spreading tree of Jamaica, affording agreeable shade to cattle, and a wholesome fruit containing sweet mucilaginous pulp, of great value for them in the season of drought when all herbage is scorched. The bark of young trees is used in Martinique to clarify sugar, and the light wood is serviceable to the natives; the leaves, like others of this tribe, droop during the night, while the leaf-stalks remain upright. The fruit of Abroma is said to be uneatable by either men or animals. Dombeya *spectabilis* yields a strong cordage in Madagascar; Microlæna and Abroma are of equally fibrous nature. Astrapæa is a noble evergreen, bearing large drooping heads of flowers of a splendid red colour. Kydia *calycina* is valued by the natives of India for its medicinal bark. Two species of Melhania produce the Red-wood and the Black-wood of St. Helena. Hermannia is a low shrub of no value, but several species are to be seen in conservatories with small downy wrinkled leaves, and numerous yellow flowers, the petals of which remain curiously folded over each other. The different species of Waltheria are natives of the East Indies and Brazil. Lasiopetalum (3) belongs to the division of this Order in which the coloured and usually downy calyx forms the apparent flower, the petals, if present, being minute scales; the anthers open by two small pores.

The different sections of this Tribe are dispersed in various regions of the world; some are limited to the Tropics, others belong to Temperate climates. Byttneria and its immediate allies are natives of Asia and America; Hermannia and others, of the Cape of Good Hope; Dombeya and a few more, of Africa and Asia; Eriolæna and others, of Asia; Philippodendron and others, of New Zealand; Lasiopetalum and other similar genera belong to Australia.

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BOMBACEÆ.

THE SILK-COTTON TREE TRIBE.

Large trees or shrubs, sometimes clothed with stellate hairs; the leaves are alternate, simple, or compound, some of a digitate form, often toothed at the edges, with free deciduous stipules. The flowers are variable, regular or irregular, in some cases not having both stamens and pistils. The calyx has five sepals in valves, not imbricated, and is either naked or surrounded with an involucre more or less united at the base. The petals are five, or wanting, convolute in the bud state. The stamens are numerous, united in sets in various ways; the anthers are two-celled, turned outwards, and in some species have various turnings and winding passages. The pistil consists of five, rarely three carpels, either separate or cohering into a single ovary, often placed on a column-like axis; the styles are equal in number to the carpels, distinct or united. The fruit is a capsule with three or five cells, as in Bombax; or a fleshy drupe, as in Myrodia; or a berry, or a pod bursting long before the ripening of the seeds, as in Herculia. The seeds are ovate or angular, sometimes involved in silky cotton.

This Order has affinity with Malvaceæ both in structure and properties. It is chiefly remarkable for the abundant mucilage contained in the plants, and for the profusion of silky cotton in the seed-vessels of Bombax and others.

Bombax is more to be admired for its noble aspect than valued for its utility, although it is of some service in the countries where it is indigenous. The down of the capsules is useless for spinning, as there exists no adhesion between the hairs; it has, however, been employed in South America for hats, and is occasionally used by the poor natives for stuffing cushions, but is considered unwholesome for beds. Bombax *heptaphyllum* (1) is one of the largest of East Indian trees, and is found in various districts throughout the country, growing to a greater size near the hills than elsewhere, often attaining 100 feet in height. It begins to blossom about the end of winter, before the leaves come forth, and has a splendid appearance when covered with its bright red flowers. The trunk is straight, covered with many sharp conical prickles; the bark is rough, ash-coloured on the outside, the branches grow horizontally, and are also armed with prickles. The wood is white, light and spongy, fit for few purposes except to make floating rafts; in India the cotton is put between quilted cloths.

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1. Bombax *heptaphyllum, Silk-cotton Tree.* East Indies.
2. Bombax *pentandum.* West Indies.
   2a *Seed-vessels.*
3. Helicteres *verbascifolia, Mullein-leaved Screw-tree.* Brazil.
4. Helicteres *vevispira.*
   4a *Pistil* 4b *Seed-vessel.*

B. *pentandrum* (2) abounds in Antigua and other West Indian Islands; the seeds are eaten, and the soft brown cotton is used by the natives. B. *ceiba* is an immense tree in South America and the East Indies; the spiny trunk spreads out into enormous buttresses at the base, it is often hollowed out into a canoe of twenty-five tons burden, carrying from fifteen to twenty hogsheads of sugar. Columbus found one of these canoes on his first discovery of Cuba, which was capable of containing 150 men. When the tree decays it becomes food for the Macaca beetle, which is fried and eaten as a delicacy by West Indian epicures.

In the mass of luxuriant vegetation which covers the tract of country bounding the Great Desert of Africa on the south, the tree most likely to attract the attention of a traveller is the enormous Adansonia *digitata*, the *Baobab* or *Calabash* tree; this is supposed to be the largest production of the vegetable kingdom, and to be of the greatest longevity. Adanson measured some on the banks of the Senegal more than seventy feet in circumference, the trunks were about fifteen feet high before branching, the immense horizontal branches were fifty feet in length, descending by their weight to the ground at their extremities; the portion of the roots above ground was often upwards of 100 feet long; the whole tree forms an hemispherical body sometimes as much as 150 feet in diameter. The oblong fruit is about ten inches long, downy on the exterior of the brown rind, the interior is filled with a white farinaceous pulp containing the seeds; it has a pleasant acid flavour, and is much eaten by the Africans, who also prepare a medicine and a kind of soap from it. The rind of the fruit serves for useful vessels, the bark furnishes a coarse fibrous thread, of which they make ropes and cloth; the young leaves are eaten in times of scarcity, the larger are used to thatch their huts. Adansonia was long ago introduced into India; large trees exist at Allahabad, and other places in India and in Ceylon. Herculia *Tragacantha* of Sierra Leone yields a famous gum; the seeds of this and other species contain an oil that might be used for lamps. Helicteres (4) is remarkable for the twisted seed-vessel; although chiefly natives of S. America, H. *Isora* and a few other species are found in India and China. Cheirostemon *platanoides*, the singular Hand-plant of Mexico, has no petals, but a large leathery calyx, from the centre of which arises a column of five curved anthers, and a curved style, thought to resemble a hand or claw. Durio *Zibethinus* is much cultivated in the Isles of the Indian Archipelago for its fruit.

Nearly all the plants of this tribe are natives of the Tropics, where they are extensively dispersed; Bombax abounds in America and India, Adansonia and Herculia belong chiefly to Africa and India, Helicteres and its immediate allies seem to be unknown in Africa, but a few species extend beyond the usual limits of the Order, as far as Tasmania and New Zealand: none belong to Europe.

Malvaceæ
The Mallow Tribe

Day & Son in Lond.

TILIACEÆ.

THE LINDEN OR LIME-TREE TRIBE.

Trees, shrubs, and a few herbaceous plants. The leaves are alternate, simple, toothed at the edge, with stipules at the base. The flowers are generally perfect; the sepals of the calyx are four or five, distinct or united; the petals are also either four or five, entire or fringed at their edges, usually with a small pit at their base, occasionally entirely wanting. The stamens are generally numerous, growing at the base of the pistil, sometimes surrounded by the enlarged border of the lower part of the pistil. The anthers are two-celled, opening lengthwise, or by pores; the outer stamens are sometimes of a petal-like form. The ovary is composed of from two to ten carpels, which are in some cases disunited; the single style is terminated by as many stigmas as there are carpels. The fruit is dry or pulpy, often prickly, sometimes winged; it contains several cells, or one only becoming perfect; the seeds are solitary or numerous. In most respects this tribe has affinity with the Mallow tribe, and others connected with it.

The character of the whole Order is to contain a wholesome mucilaginous juice.

Tilia *Europæa* (1) is now naturalized in England, if not originally a native of our island; it may be reckoned amongst the most elegant of European trees; the foliage is of a delicate texture, and of a very bright green in spring; the upper surface of the leaves is smooth, at the branching of the veins beneath is a small tuft of brown woolly hairs. The flower-stalk is attached for about half its length to a pale membranous bract; the flowers are of a yellowish green colour, highly odoriferous, especially in the evening; they are considered a remedy for coughs, and yield a large supply of honey to bees; the honey obtained from the Linden-trees in the forest of Kowno, Lithuania, is esteemed more than any other. The wood of the Lime is light and fine-grained, and serves for many useful purposes; it was selected by Gibbons for his celebrated carvings, specimens of which are highly valued, in the choir of St. Paul's, London, in the library of Trinity College, Cambridge, and in various edifices. The bark of the different species affords strong tough fibres for matting and cordage, the young twigs are made into

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1. Tilia *Europæa, European Lime.* England.
   - 1A *Capsule.*
   - 1B *Cross-section of capsule.*
   - 1C *Seed.*
2. Sparmannia *Africana, African Sparmannia.* Cape of Good Hope.
3. Grewia *occidentalis, Elm-leaved Grewia.* Cape of Good Hope.
4. Elæocarpus *cyaneus, Blue-fruited Elæocarpus.* New Holland.
   - 4A *Petal.*
   - 4B *Stamen and Pistil.*
   - 4C *Anther.*

baskets, and the sap produces sugar. In the last half of the seventeenth century, Evelyn encouraged the planting of Lime-trees in London, and in country parks, to a great extent; and about the same period they were generally adopted in France, for public gardens and avenues, instead of the Horse-chesnut, which until then had been the favourite tree. On the ramparts of many ancient German cities the Linden-trees flourish most luxuriantly, forming a delightful shade, and perfuming the air with their fragrance to a great distance, as at Augsburg and Worms. In the modern city of Berlin, the famous street, *Unter den Linden*, is shaded by four rows of trees, chiefly Lime. It is said that the ancestors of Linnæus derived their name from an old Lime of vast size which grew near their abode, *Linn* being Swedish for the Lime-tree. Sparmannia *Africana* (2) was named in memory of Anders Sparmann, of Stockholm, a celebrated traveller in China, in the South Sea Isles, and at the Cape of Good Hope, where he discovered this beautiful shrub. The calyx is white, and appears to form part of the flower with the petals; the long yellow nectaries which surround the stamens are of a singular club-shape; the whole plant abounds with a tasteless mucilage. Grewia *occidentalis* (3), named by Linnæus after Dr. Grew, author of a work on "The Anatomy of Vegetables," is a shrub of no particular beauty; the inner surface of the sepals is coloured like the petals, which have at their base a small nectariferous scale of the same purple colour. G. *elastica*, and other East Indian species, produce a little purple berry, of pleasant acid flavour, used in making sherbet. G. *oppositifolia* grows on the lower range of the Himalaya, and yields a fibrous inner bark of the same nature as that of Tilia. Corchorus *olitorius* contains so large a portion of mucilage as to be eaten as a vegetable in India and in Egypt; its fibres, as well as those of C. *capsularis*, are made into a coarse cloth in Bengal, used for garments by the poor, for rice-bags and for cordage; a kind of paper is also made from it. The wood of Aristotelia *maqui* is used for musical instruments in the East, the strings are formed from the tough bark; the berries are made into wine. Berrya *amomilla*, of Trincomalee, is employed in the construction of the famous Madras boats.

Elæocarpus *cyaneus* (4) belongs to the division of this Order that has fringed petals, and anthers opening by a pore at the top. The fruit is of the size and shape of the olive; it is eaten by the natives of India in curries; the hard furrowed seeds are frequently worn as beads, and are sometimes set in gold as ornaments for Europeans.

The principal portion of this Tribe is to be found within the Tropics, either as fine trees, shrubs, or small plants; those which are peculiar to the northern countries of both hemispheres are timber trees. Several species are widely scattered throughout India and China. Tilia is the only genus belonging to Britain.

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Sapindaceæ

The Soap Tree Tribe

Day & Son, Lumite

SAPINDACEÆ.

THE SOAP-TREE TRIBE.

Trees, shrubs sometimes having tendrils, and a few herbaceous climbing plants. The stem has frequently several distinct axes of growth. The leaves are alternate, compound or simple, with or without stipules, often marked with lines or pellucid dots. The flowers are on branching stalks or panicles, small, generally white; the calyx is more or less deeply parted in four or five divisions, imbricated in the bud. The petals are four or five, occasionally absent, alternate with the sepals, inserted on the base of the disk, sometimes having an appendage in the inner side. The disk is fleshy, expanding between the petals and the stamens. The stamens are sometimes in separate flowers, they vary from eight to twenty; the filaments are free or combined at the base; the anthers turn inwards and burst lengthwise. The ovary is three-celled, the style simple, or more or less deeply two or three cleft. The fruit is sometimes a capsule, two or three valved, sometimes extended at the back into a membranous wing, sometimes fleshy and whole. The seeds have usually an aril and a large scar at the base, the outer covering is crustaceous or membranous; the inner one soft and pellucid, of a saponaceous nature: the seeds contain no albumen, the embyro is usually curved or spirally twisted.

This Order has affinity with the Horse-chesnut and the Maple tribe; with the former, in the saponaceous properties of the fruit; with the latter, in the winged fruit of some species.

The curved or twisted embryo is a general character of the Order, poisonous properties exist in many of the plants.

Sapindus is derived from *Sapo-indicus*, Indian soap, the pulpy fruit being used by the Americans in washing linen, for which purpose it is very efficacious, requiring only care to avoid injury from the acrid properties. The fruit of S. *Saponaria*, the common soap-berry, is about the size of a cherry, inclosing a

1. Sapindus *juglandifolius*, *Walnut-leaved Soap-Tree.* Rio Janeiro.
   - 1A *Flower, magnified.*
   - 1B *Petal, front.* 1C *Petal, back.*
   - 1D *Section of Ovary.*
2. Melicocca *bijuga*, *Honey-Berry.* Jamaica.
   - 2A *Flower,* 2B *magnified.*
   - 2C *Seed.*
3. Nephelium *Litchi*, *Chinese Litchi.* China.
   - 3A *Seed.*
4. Cardiospermum *anomalum.* Brazil.
   - 4A *Stamen and Calyx, magnified.*
   - 4B *Section of Ovary.*
   - 4C *Upper Petal.*
   - 4D *Lower Petal.*
5A. *Fruit of* S. *frutescens.*
   - 5B *Fruit, open.*
6. *Membranous Capsule of* Urvillea *glabra.*
7. Ophiocaryon *paradoxum*, Demerara *Snake-Nut.*

shining black seed: the whole plant, but particularly the fruit, is poisonous to fish. The flowers of S. *juglandifolius* (1) are of insignificant appearance, but of curious construction, the petals smooth outside, but densely downy on the inner surface, where there is a two-lobed appendage arising from the claw, also downy; the stamens are hairy on the lower part. The leaves of S. *frutescens* (5) are eleven inches long and three wide; the outer skin of the fruit is of a fine red colour, the inner pulp yellow, containing one black seed enveloped in a membranous covering. These glossy seeds were formerly brought to England and used as buttons, sometimes tipped with silver, and considered very ornamental as well as durable. In this and other species one of the cells alone ripens the seed, another remains imperfect at the base. S. *esculentus* affords a fruit much relished by the inhabitants of Brazil. Melicocca *bijuga* (2) is a tall elegant tree with shining foliage. The terminal branches bear numerous small white flowers of very grateful odour; the inner pulp of the fruit resembles the yolk of an egg in appearance, and has a sweet taste mingled with a little acid. In some parts of South America and in Jamaica it is much cultivated. Nephelium *Litchi* (3) is a favourite fruit in China, frequently brought to England in a dried state, and esteemed, although it possesses in a strong degree the peculiar mixture of sweet and acid flavour. N. *Longan* is another species, the fruit of which is eaten in China. Cardiospermum is a slender climbing plant, named from having a white heart-shaped scar on the black seed; the triangular capsule of C. *halicacabum* is extended at the back into membranous wings, whence it is sometimes called the Balloon vine. The flower-stalk has a pair of small curling tendrils below the triple division; the petals are four, small and white; the singularity of the seeds appears to have early attracted the notice of travellers in the East and West Indies, for plants were raised in England in 1594. Although so slender in its growth, it climbs to the tops of the highest trees in Jamaica; various parts of the world are suited to it, being found at Rio Janeiro, in New Holland, Otaheite, and other isles of the Pacific Ocean. Urvillea (6) is a genus of a very similar aspect, and graceful climbing character, having compound triple leaves with tendrils at the base of each. Serjania is another genus of the same class. Paullinia *pinnata* is a strong narcotic poison, used by the natives of Brazil slowly but surely to destroy life. The Indians of Guiana employ the juice of P. *cururu* to poison their arrows. The fruit of Pappea *capensis* is eaten at the Cape, and an oil is obtained from the seeds. Ophiocaryon (7) shows the twisted embryo in the highest degree.

This Tribe inhabits most parts of the Tropics, especially of South America and India; it is found in Africa. Dodonea represents it in Australia. It is unknown in the United States of America, in Europe, and in all cold countries.

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HIPPOCASTANACEÆ.

THE HORSE-CHESNUT TRIBE.

Trees and shrubs; the leaves of which are opposite, compound, with five or seven leaflets, without stipules; the racemes of flowers are terminal, somewhat panicled, the flower-stalks jointed to the main-stalk. The calyx is campanulate, with five lobes. The petals are five, occasionally only four, unequal in size; the stamens are seven or eight, distinct, unequal, inserted on a disk. The anthers are turned inwards, and open longitudinally. The ovary is rounded, three-cornered, and three-celled; the style single, slender, conical, and acute; the fruit is coriaceous, one, two, or three valved, spiny or smooth, usually only ripening one seed. The seeds are large, smooth, and shining, with a broad pale hilum or scar; they contain no albumen.

This Order is very closely allied to Sapindaceæ, the Soap-tree tribe, in structure and properties; saponaceous principles existing in the seeds of both.

Æsculus *Hippocastanum*, the Horse-Chesnut (1) was brought about 300 years ago from the mountains of Northern Asia to Constantinople, thence to Vienna, Italy, France, and England; in the two latter countries the regular and noble character of its form soon caused it to be adopted for avenues, one of the finest specimens of which in this country is that of Bushy Park, Middlesex. The flower-buds come forth at the ends of the branches, in winter, protected by several glutinous scales, which remain and grow for some weeks, until the warmth of the sun in spring dissolves the gummy substance, and the expansion of the flowers within causes them to fall off, when the cluster of upwards of sixty flowers proceeds rapidly in its growth. The large spikes of delicate white and pink flowers which appear abundantly in May, and the massy foliage, place the Horse-Chesnut in the highest rank of our ornamental trees; it is besides extremely rapid in its growth, and well suited to the English climate, even in the vicinity of towns. The wood is white and soft, and available for a few purposes; the bark is bitter and astringent, useful for tanning, and is supposed to possess febrifugal properties. The large seeds contain a considerable portion of starch and potash, and are capable of affording nutrition to animals; deer eat them readily when fallen out of the prickly covering; in Switzerland, they are given to sheep with good success, and it is said that horses are fed on them in Turkey. If the bitter acridity could

1. Æsculus *Hippocastanum*, *Common Horse-Chesnut.* Asia.

1A *Petal.*

1B *Calyx and Pistil.*

1C *Fruit.*

2. Pavia *rubra*, *Red-flowered Pavia.* North America.

be entirely extracted, they might probably be made into a kind of bread. In some parts of France and Switzerland, they are used in cleansing wool and bleaching linen, for which the soapy properties are well fitted. It is asserted that the leaves and fruit of Æsculus *ohiotensis*, the Buck-eye or American Horse-Chesnut, are poisonous to man and animals.

Pavia was named after Peter Paw, a Dutch botanist of Leyden in 1600. Pavia *rubra* (2) was introduced to this country from North America in the beginning of the last century; it is a tree of less magnitude than the Horse-Chesnut, but the spikes of crimson flowers nearly rival in size those of the Horse-Chesnut. The fruit of this genus is smooth. P. *indica* is found on the mountains of Kemaon and Gurhwal in India, also near the sources of the Ganges; in growth and aspect it equals the common Æsculus; the large seed contains much starch, and although bitter to the taste, is occasionally eaten by the natives of the Himalayas in times of famine. P. *flava* and P. *discolor* are now both added to English shrubberies.

The few plants belonging to this Tribe are natives of India, Persia, and North America.

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ACERACEÆ.

THE MAPLE TRIBE.

Trees, with nodose branches, the leaves of which are opposite, simple, stalked, usually with palmate veins, rarely pinnate, without stipules. The flowers grow on branching stalks from the base of the leaf-stalk, either in upright or drooping clusters: sometimes the pistil and stamens are in different flowers, sometimes united. The calyx is divided into five lobes, rarely from six to nine, often coloured; the petals are equal to them in number, and agree with them in colour, they are inserted round a fleshy disk, in some instances they are wanting. The stamens are placed on the disk, are usually eight, rarely five or twelve; the filaments are free, anthers oblong, two-celled. The ovary is free, with two lobes, the style single, bearing two stigmas. The fruit is a samara, or winged closed capsule, consisting of two connected carpels, each being one-celled, containing one or two erect seeds without albumen.

This Order has affinity with Sapindaceæ and Malpighiaceæ, although the opposite leaves, and fruit with only two carpels distinguish it from the former, and the palmate-veined leaves and glandless calyx separate it from the latter.

A saccharine juice is the chief property of these trees; the astringent bark yields a brown and a yellow dye.

Acer *campestre*, the Maple (1) is a small tree very abundant in woods and hedges in most European countries, but becoming rare northwards; seldom seen in the northern part of England, or in Scotland; unknown in Iceland. It has been in all times esteemed for the fine grain and durability of the wood; Virgil describes the throne of Evander as made of maple, and the Romans made their tables of it, mahogany not being then introduced into Europe: it was formerly employed for pikes and lances, now for gunstocks and various musical and mathematical instruments; the old knotted parts, being much variegated, are also very useful in ornamental inlaid cabinet work; the bark is often of a thick corky nature, full of fissures. Acer *Pseudo-platanus*, the Sycamore (2), resembles the Plane in general aspect, and rivals it in beauty; it is a native of the principal Continental countries of Europe, but is supposed to have been transplanted to England, where it flourishes vigorously, and can endure without injury the breezes from the sea. The wood is soft and used only for some agricultural implements. Its sap abounds

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1. Acer *campestre, Common Maple.* England.
   1A *Flower.*

2. Acer *Pseudo-platanus, Sycamore.* Europe.
   2A *Winged Seed-vessel.*
   2B *Seed within.*

3. Acer *caudatum.* Nepal.

in saccharine juice, which may be obtained in spring, and converted into wine or sugar. Acer *caudatum* (3) was discovered by Dr. Wallich, in the highest region of Nepal, where it is a noble tree, distinguished by the delicate colour of the winged seed-vessels. A. *lævigatum* belongs to the same country, grows to the height of forty feet, is remarkable for the oblong serrated leaves, the white flowers, and red-brown fruit; the timber is employed by the natives. A. *cultratum* is found at about 6500 feet on the mountain-ranges, its wood is white and fine-grained. A. *oblongum* grows at the lowest elevation between 2000 and 3000 feet. On the mountains of Bootan, north latitude, 27, east longitude, 91, A. *sterculiaceum* ascends to the height of 12,000 feet, nearly to the limit of woody vegetation. The most valuable tree of this tribe, Acer *saccharinum*, the Sugar Maple, belongs to the New World, but might in all probability be successfully cultivated in the valleys and slopes of the Himalaya, where it would be of great value to the poor natives who have no means of obtaining sugar. It attains sixty feet in height in North America, and a single tree is said to yield in the spring sufficient juice to produce five or six pounds of sugar by evaporation, it affords also a pleasant wine, and an excellent vinegar. A. *rubrum*, the Swamp Maple of Pennsylvania, has a scarlet calyx, without petals, the stem furnishes useful timber, sugar, and treacle to the Canadians, the bark dyes a dark blue colour. The Italian Maple, A. *Opalus*, is much planted in avenues in public gardens in Italy for the sake of its spreading shade. The principal species found in the mountain districts of the more northern countries of Europe is A. *platanoides*, a quick-growing handsome tree, bearing yellow flowers in spring, and the foliage acquiring a fine golden tint in autumn; although usually growing on mountains, it descends to the sea-shore in some parts of Norway. Negundo *fraxinifolium* of North America has compound leaves like the ash. Dobinea, discovered in Nepal by Dr. Hamilton, differs from the rest of the tribe in having a campanulate four-toothed calyx, and eight stamens united into a column, it is besides of a shrubby character, about six feet high.

This small Tribe is dispersed over Europe, the Temperate parts of Asia, the mountain-ranges of northern India, and North America: it is unknown in Africa and the Southern hemisphere.

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MALPIGHIACEÆ.

THE BARBADOES CHERRY TRIBE.

Trees and shrubs, some of which are of a climbing habit. The leaves are usually opposite or whorled, rarely alternate, simple, generally entire at the edges, sometimes having glands either on or underneath the leaf-stalk. The stipules are short, and soon fall off. The flowers vary, those of some species are complete, others have only stamens or pistils; they are most commonly yellow, rarely white, and very seldom blue, a few are red; in some scarce instances imperfect green flowers are intermingled with the perfect ones. The calyx is five-parted, with large glands at the base of one or all the sepals, very rarely without glands. The petals are five, clawed at the base, convolutely folded in the bud. The stamens are mostly double the number of the petals, often united at their base. The carpels are usually three, rarely two, very rarely four, either partly or entirely consolidated at the end, or cut off, or variously expanded. The fruit is either a drupe as in Malpighia, or a woody nut as in Hiptage, or winged as in Ryssopteris.

The most striking peculiarity of this Order is the presence of the large glands on the calyx, these are secreting organs filled with a kind of oil containing a fluid substance besides one that is concrete. Another remarkable circumstance is the tendency among the stems of the climbing species to acquire a very singular form of growth, by having the usual centre of pith and wood surrounded with irregularly-lobed and zoneless ribs, as may be distinctly seen in a section of the stem of Heteropterys *anomœla*.

Scarcely any uses are made of these plants, except in the countries where they are indigenous.

Malpighia, an American genus, was named after Malpighi, a botanist and physician of Bologna, in the last century. Malpighia *aquifolium* (1) bears a small fruit in South America; M. *glabra* and M. *urens* are cultivated in the West Indies for the sake of the fruit, which is eaten by the natives, and is called *Barbadoes cherry* by Europeans, although much inferior to the real cherry. The leaves of M. *urens* are covered with sharp bristles which are painfully pungent:

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1. Malpighia *ilicifolium*, *Holly-leaved Barbadoes Cherry*. West Indies.
   1A *Section of Ovary.*
2. Banisteria *chrysophylla*, *Golden-leaved Banisteria*. Brazil.
3. Stigmaphyllum *aristatum*, *Awned-leaved Stigmaphyllum*. Brazil.
   3A *Sepal and Glands, magnified.*
   3B *Stamen, magnified.*
   3C *Pistils, magnified.*
   3D *Pistils and Stamens, magnified.*
4. *Winged Seed-vessel of* Ryssopteris *timorensis.*
5. *Carpels of* Diplopteris *paralias.*

the under-surface of the leaves of M. *aquifolium* and other species are also beset with long slender bristles.

Banisteria *chrysophylla* (2) has fine bright foliage of a peculiarly golden hue on the under side. Stigmaphyllum *aristatum* (3) is a beautiful climbing plant with curious flowers, the name explains the leafy nature of the stigmas which are three in number and in the form of a concave leaf; by a twist in the stalk of the stigmas they are brought immediately over the three perfect anthers. The folding of the petals in the bud is worthy of examination, so beautifully are they arranged; the two larger petals are neatly tucked under the points of the sepals: within lie the two side petals one over the other, the smallest petal lies innermost, the two lobes of its claw being inserted under the two nearest stigmas; the third stigma is between the two largest and outermost petals. At the base of the calyx are two oval glands on each sepal, except that which is between the two largest petals.

The bark of Byrsonima is employed for tanning in Brazil, that of B. *crassifolia* yields an antidote to the bite of rattlesnakes; the wood of B. *verbascifolia* and others is of a bright red colour; the fruit of some species is eatable; Alcornoco bark is said to be the produce of B. *laurifolia* and others.

The seed of Bunchosia *armeniaca*, a Peruvian tree, is supposed to be poisonous.

Hiptage and Hirea are two climbing genera, scattered over every part of India, Hiptage *Madablota* extends into the valleys of the Himalaya as far north as the Deyra Doon, climbing over lofty trees, adorning them with its elegant fringed white flowers, slightly tinged with pink and yellow. Hiptage *obtusifolia* is a native of China.

Almost all the plants of this Tribe belong to the Tropics; the chief portion is to be found in South America, nearly three hundred species are natives of Brazil; many grow in Mexico and the West Indies, some in Africa and Madagascar, a few in India and Ceylon, the isles of the Indian Archipelago, China, and Polynesia. None belong to Europe.

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Hibiscus cannabinus L.
The Hibiscus Tribe

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HIPPOCRATEACEÆ.

THE HIPPOCRATEA TRIBE.

Arborescent or climbing shrubs, which are almost always smooth. The leaves are opposite, simple, entire at the edges, or toothed, somewhat leathery, with small stipules at the base soon falling off. The flowers grow in clusters from the base of the leaf-stalks. The flowers are small and inconspicuous: the sepals of the calyx are five, minute, combined at the base, persistent: the petals are five, partly folded over each other in the bud. The stamens are three; the filaments are wide at the base, and cohere to form a thick disk around the ovary; the anthers open transversely at the point. The ovary is free, partly concealed within the disk of the filaments, three-celled, surmounted by one style, and either one or three stigmas. The fruit consists either of three dry carpels, as in Hippocratea, or of a berry with one to three cells, as in Salacia; the seeds are attached to the axis of each cell, in pairs; in some instances they are winged.

The winged fruit of some species connects this Order with Malpighiaceæ; there are also some affinities with the Spindle-tree tribe.

The fruit of some of these plants contains oil.

Hippocratea was so named by Linnæus in memory of Hippocrates, a descendant of Esculapius, and the renowned founder of a scientific school of medicine in Greece, 2300 years ago. He was deeply studious of natural history, and having travelled through a great part of Asia, the genus of plants selected to bear his name is not inappropriate. Hippocratea *arborea* (1) has a slender stem, with smooth brown bark; the young weak branches are usually disposed to climb over trees; the flowers appear in July; the fruit does not ripen till March; two seeds lie in the top of each carpel, and have a long thin wing extending to the base. H. *indica* extends in Bengal as far as the mountains at Monghyr. H. *comosa*, the wood almond of the Antilles, bears thick clusters of small flowers on fine feathery branches; the seeds are oily, of sweet, pleasant flavour, and are much esteemed; the flowers have a bitter taste, and are said to be used as a remedy in fever. The seed-vessels of H. *velutina* are clothed with a velvet-like down. The flowers of one species are extremely fragrant. The manner of growth of these plants varies much.

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1. Hippocratea *arborea*, *Tree Hippocratea.* Hindostan.
   - 1A *Seed-vessels.*
   - 1B *Winged Seed.*
2. Tontelea *scandens*, *Climbing Tontelea.* South America.
   - 2A *Calyx.* 2B *Flower.*
   - 2C *Fruit.*
3. A. *Flower of* Hippocratea *Arnottiana.*
   - 3B. *Section of Ovary.*

   East Indies.
4. *Fruit of* Salacia *prinoides.* East Indies.

H. *volubilis* twines and twists its branches in knotted curls over other trees. H. *Schimperiana* of Sierra Leone grows stiff and straight, the opposite branches forming right angles with the stem.

Tontelea *scandens* (2) was discovered by Aublet, near the River Pinemari, about a hundred miles from the coast of the Pacific: it spreads its long branches and tough leaves over lofty trees, sending out roots from its branches; the small green flowers are of very insignificant appearance. Several kinds of Tontelea in Brazil are said by Martius to have a sweet, mucilaginous fruit. Salacia *prinoides* (4) has a small, eatable, pulpy fruit; that of S. *pyriformis*, of Sierra Leone, is much larger, and is also eaten by the natives. Several species of Salacia belong to the same regions of India as Hippocratea, and some extend to the Burmese country and the Malay Isles. Johnia *coromandelliana* produces an eatable berry of agreeable flavour.

The chief portion of this Tribe belongs to South America; a few species are natives of Africa and the Mauritius: some grow also in the Peninsula of India, but none have been discovered in the northern provinces.

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LTab. The St. John's Wort Tribe.

HYPERICACEÆ.

THE ST. JOHN'S WORT TRIBE.

Trees, shrubs, herbaceous and annual plants, having a resinous juice, and often with angular branches. The leaves are opposite, entire, without stipules, occasionally alternate, sometimes notched at the edges, usually impress with transparent dots, and bordered with dark glands. In almost every instance, the flowers are yellow, the rest red or white; the form of inflorescence is various, though the flowers are regular. The calyx has four or five sepals free from the ovary, two exterior, three within, either separate or partially united. The petals are of the same number as the sepals, unequal sided, twisted spirally in the bud, sometimes bordered with black dots, and often having a fleshy scale or hollow at their base. The stamens are numerous, growing from the base of the pistil, either distinct or united into one, or generally many sets; the filaments are slender, the anthers two-celled, opening lengthwise, frequently surrounded by a gland. Small fleshy glands are in some species placed between the sets of stamens, as in Parnassia and others. The carpels are three or five, partly united around an axis, the styles are of the same number, usually distinct, but occasionally cohering to the base. The stigmas are capitate or truncate, rarely two-lobed. The fruit is sometimes one-celled, but in most cases either a dry or a fleshy capsule of many valves and many cells. The seeds are minute, usually tapering at the point.

The unequal sided petals, and dark glands upon their edges, and the stamens united in sets, are the chief distinguishing points of recognition in this Order.

An essential oil is contained in the glands of Hypericum resembling those of the Orange tribe; a yellow juice in other parts of the plant, as well as some points of structure, connect this tribe with Clusiaceæ.

The different species of Hypericum are chiefly small undershrubs; a few which grow in the woods and hedges of England and other countries of Europe are her-

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1. Hypericum *calycinum*, *Large-flowered St. John's Wort.* Ireland.
2. Hypericum *pulchrum*, *Upright St. John's Wort.* England.
   - 2A *Cross section of Seed-vessel.*
   - 2B *Sepal of Calyx, magnified.*
3. Androsæmum *officinale*, *Tutsan.* England.
   - 3A *Pulpy Capsule.*
4. Hypericum *ægyptiacum*, *Egyptian St. John's Wort.* Egypt.
   - 4A *Petal.*
   - 4B *Pistils.*
   - 4C *Stamens.*
5. Hypericum *elodes*, *Marsh St. John's Wort.* England.
6. Parnassia *palustris*, *Grass of Parnassus.* England.
   - 6A *Stamen.*
   - 6B *Nectary.*
   - 6C *Ovary.*
7. *Capsule of* Vismia *guianensis.*
   - 7A *Cross-section of Capsule.*

baccous. Some are of much beauty and delicacy, the bordering of round glands giving a peculiar ornament to the delicate flowers. Hypericum *calycinum* (1) is a well-known evergreen plant in shrubberies, where it spreads over the ground, flourishing well under the shade of trees, and producing abundantly its bright golden flowers during the summer. H. *pulchrum* (2) is an elegant species, frequent in woods or heathy places, on a clay soil. H. *perforatum*, a British species, is also a native of France and Germany; it was formerly valued by the peasants as a charm against storms and other dangers. In Scotland it was considered a preservative against witchcraft; and if gathered on the eve of St. John, was supposed by the imaginative to be endued with peculiar power. Its more real properties consist in dyeing wood of a yellow colour, and in the flowers imparting a fine purple hue to spirits and oil; it was also used as a healing balsam in the olden time. This is one of our British plants which is also found on the Himalaya. The bruised seed-vessels and the leaves of Androsæmum *officinale* (3) have long been reputed beneficial for slight wounds in France, where the plant is still called *Toute-saine*, whence the common English name Tutsan was derived. The fruit of this species is pulpy, and has the appearance of a berry. This is almost entirely an European species, but has been seen in Greece.

Parnassia *palustris* (6), said to have been first discovered on Mount Parnassus, is one of the most delicately beautiful of our marsh plants, and does not appear to be surpassed by any other species; that of Carolina has a larger flower, but is of a greener colour, and the nectaries are crowned by only three glands each. Elodea has also bundles of glands between the stamens. Elodea *virginica* is a medicinal plant of the United States.

Vismia *guianensis* (7) yields a copious yellow gum, known as gummi gutta, Vismia *micrantha* and V. *laccifera* of Brazil contain a gum resin similar to gamboge. The leaves of Hypericum *laxiusculum* are supposed to afford a remedy against the bite of serpents in Brazil. Cratoxylon is also used medicinally. Ascyrum is a North American genus of evergreen shrubs.

The plants of this Tribe are very widely spread over the earth, on mountains and in valleys, in meadows and on heaths, marshes and dry plains. North America possesses the largest number of species; in South America about half the number have been found; to Asia belong several species of arborescent shrubs, growing in the south of India, and others are scattered over the Himalaya.

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The Camboge Tribe.

CLUSIACEÆ.

THE GAMBOGE TRIBE.

Trees and shrubs, some of which are parasitical; nearly all yield a resinous juice. The leaves are opposite, without stipules, leathery, entire at the edge, with a strong mid-rib, the side veins often running straight to the margin. The flowers are usually numerous, terminal, or from the base of the leaf-stalk, jointed to their stalk, having occasionally stamens and pistils in separate flowers. The calyx has two, four, six, or eight sepals, in alternate pairs, usually persistent, round, membranous, unequal, frequently coloured like petals. The flower is composed of petals equal in number to the sepals of the calyx, sometimes passing insensibly into them. The stamens are numerous, distinct or combined in sets, placed below the ovary, rarely of any definite number; the filaments are of various lengths, the anthers usually bursting inwards, sometimes opening by a pore, or transversely, sometimes immersed in a fleshy receptacle. The ovary is solitary, one or many-celled; the ovules are solitary or numerous. The style is very short or absent; the stigma is circular or radiate. The seeds are often embedded in pulp, their covering thin and membranous, frequently having a torn covering at the base.

This Order has affinity with Hypericaceæ, but differs in the parts of the flower being of even numbers, instead of five, in the jointed flower-stalk, and in other points.

An acrid, yellow, resinous gum is the prevalent secretion of these plants.

Clusia, the type of this Order, was named after an excellent botanist and traveller of Flanders in the sixteenth century. The trees abound in a glutinous balsam, and are of considerable beauty of foliage, flower, and fruit. C. *insignis* (1) is one of the finest of the species, yielding a copious aromatic resin from the stalks and stem, drops exuding from the scars of the leaf-stalks; the stigma, also, which is densely clothed with small scales, is usually covered with a yellow wax-like resin; when dry, it becomes brown and resembles benzoin. C. *rosea* is an extremely beautiful tree, growing on rocks and not unfrequently on other trees, the glutinous seeds taking root in hollow parts, in the same manner as the Mistletoe, but the resemblance of habit soon ceases, for Clusia, being capable of attaining a height of thirty feet, cannot remain in its parasitical situation; roots protrude from the cavity and descend to the ground, sometimes from an elevation of forty feet,

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1. Clusia *insignis, Noble Balsam-tree.* Tropical America.
   - 1A *Stamens and Pistil.*
   - 1B *Stamen, magnified.*
2. Garcinia *speciosa, Showy Garcinia.* East Indies.
3. Mammea *Americana, Mammee Apple.* South America.
   - 3A *Seed.*
4. *Fruit of* Clusia *alba, White-flowered Balsam-tree.* South America.

there taking more independent growth, the tree soon acquires its natural vigour and size. The fruit when ripe opens at the divisions of the cells, exposing the scarlet mucilaginous seeds. C. *alba* has a stem of one foot in diameter, with a spreading crown, the white flowers are small, the petals hollow; the red fruit filled with pulp and seeds, affords food to the birds of the forests in South America. Garcinia *speciosa* (2) is the largest example of the flowers of this genus, of a bright colour and extreme fragrance. The leaves are large and glossy. Almost every part of the tree yields a yellow juice, resembling gamboge. The fruit of G. *Mangostana* is the delicious Mangosteen of the Malay Isles and the Indian Archipelago; the fruit is of the shape of an orange, rough on the exterior. G. *cochinchinensis* is supposed to produce the genuine gamboge used in medicine and for painting; it comes to Europe in sticks, apparently having been rolled up in strong fibrous leaves whilst in a soft state. G. *pictoria*, of the East Indies, affords a gamboge of brilliant yellow, but not so permanent as the Chinese. The juice of Xanthochymus *pictorius* is of inferior quality, though used as gamboge. Mammea *americana* (3) is called *abricotier* by the French colonists in the West Indies, on account of the colour and consistency of the pulp of the fruit; it grows in the Caribbee Isles and on the continent of South America; from the flowers the natives made the first spirituous beverage known to them. The seeds of Calophyllum *inophyllum* contain oil, and resin exudes from the roots. C. *Calaba* produces the East Indian resin Tacamahaca. The aromatic pale yellow resin of South America is obtained from C. *brasiliense*. Verticillaria yields the balsam of Maria, and several other species contain a large proportion of balsam. Pentadesma *butyracea* is the butter and tallow-tree of Sierra Leone. Moronobea *coccinea* is supposed to afford the resinous substance called hog-gum, used as pitch. Some of these trees are valuable for their timber; that of Mesua is said to be extremely hard; Calophyllum *angustifolium* is the Piney-tree, from which remarkably straight spars are obtained in the islands to the east of the Bay of Bengal.

All these trees are natives of the Tropics; the greater part belong to South America; a few grow in Madagascar, and on the continent of Africa. Extreme heat and humidity are essential to nearly the whole Tribe.

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DIPTEROCARPACEÆ.

THE DIPTEROCARPUS TRIBE.

GIGANTIC trees, abounding in resinous juice. The leaves are alternate, rolled inwards in the bud, with veins passing from the mid-rib to the margin: the stipules are oblong, folded over the leaf-bud, and terminating the branches, like a sheath, until they fall off: the flowers are either solitary or several, from the base of the leaf-stalk, or on terminal branching panicles: the calyx is tubular, imbricated in the bud, five-lobed, unequal, persistent, afterwards enlarged. The petals are five in Dipterocarpus and Shorea, united into one at the base in Hopea, twisted in the bud: the stamens are numerous, distinct, or slightly combined in sets: the anthers are awl-shaped, opening longitudinally towards the point: the filaments are widened at the base: the ovary is above the base of the stamens, three-celled, each cell containing a pair of ovules: the style is single, surmounted by a simple stigma: the fruit is leathery, ripening only one cell, opening by three valves, or remaining closed, surrounded and crowned by the calyx, of which two or more divisions have become enlarged and leafy: the seed is single, without albumen.

The peculiar rolled-in stipules of these trees connect them with the Magnolia tribe; the resinous juice allies them with the Gamboge tribe; the enlarged, tough calyx resembles that of the Hazel-nut; but the limits of the Order are clearly defined, and separate it from all others.

The chief property is a balsamic resin.

The different trees of this tribe are at present unknown in a living state in the Temperate climate of Europe, although many of them would be extremely ornamental, from the stately grandeur of their form, the noble foliage, the delicate beauty of the flowers, and the singular effect of the large drooping wings of the seed-vessel, often brightly coloured. Dipterocarpus, so named from the two wings of the fruit, abounds in the East Indies and in Java; several species yield resin; that of D. *trinervis* is used as a medicine in Java, and when spread over the leaves of the Plantain, forms a kind of torch, burning with a pale light, and shedding an

1. Dipterocarpus *gracilis*, *Slender-flowered Dipterocarpus.* India and Java.
   - 1A *Pistil.*
   - 1B *Stamens.*
   - 1C *Pistil and Stamens.*
   - 1D *Seed-vessel.*
   - 1E *Section of Ovary, magnified.*
2. Hopea *odorata*, *Sweet-scented Hopea.* Chittagong.
   - 2A *Flower, magnified.*
   - 2B *Stamens, magnified.*
   - 2C *Pistil, magnified.*
   - 2D *Seed-vessel.*
3. Shorea *robusta*, *Saul-tree.* Hindostan.
   - 3A *Stamen, magnified.*
   - 3B *Pistil, magnified.*
   - 3C *Seed-vessel.*

agreeable perfume. D. *gracilis* (1) grows in woods in the interior of Java, to the westward, near Mount Parang, attaining 150 feet in height, and great thickness of stem; the hard, ash-coloured wood is very valuable for many purposes; pellucid, golden drops of resinous balsam exude from fissures in the bark. D. *turbinatus* affords a supply of the famous balsam *Gunjun*, called by the English wood-oil, much employed for painting ships and houses in Bengal; to obtain the balsam a large notch is cut into the trunk of the tree, about three feet from the ground, where a fire is kept up till the wood is charred, after which the liquid flows out. The average produce of the best trees is said to be as much as forty gallons in one season. D. *retusus*, of Java, has a very graceful appearance when the large red-winged seed-vessels hang in profusion from the branches.

Hopea *odorata* (2) is indigenous in Chittagong, perfuming the air with the fragrance of its blossoms during March. Shorea *robusta* (3), the Saul-tree of the Hindoos, is a striking object, standing singly on the outskirts of the jungles, rising to the height of 150 feet, with a straight, upright stem. It early attracted the attention of Europeans, and in one of the first collections of drawings made in the interior of India, by Mr. Longcroft, towards the close of the last century, the Saul-tree forests are skilfully represented with their peculiar character. The heavy, close-grained timber ranks next to the Teak in strength, but is less durable; the purest portion of the abundant resin is burnt as incense in the temples; in a liquid state it is used as pitch for ships. Dryobalanops *camphora*, the celebrated camphor-tree of Sumatra and Borneo, contains a large quantity of camphor in hollow cavities of a foot or more in length; this is much prized by the Indians and Chinese, and affords considerable traffic. The resin called *dhammar* is procured from Vateria *indica*; when solid, it resembles amber, and is carved into ornaments by the natives; the fruit yields a fatty substance, used as tallow.

This Tribe exists only in Asia, chiefly in India and the islands of the Indian Ocean; in Java it forms the largest trees of the forests. Shorea extends to the most northern boundaries of the tribe, being found at the base of the Himalayas.

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MARCGRAVIACEÆ.

THE MARCGRAVIA TRIBE.

Trees and shrubs, some of which are climbing, parasitical, and sending out rootlets from the knots of the branches, or base of the leaf-stalks. The leaves are alternate, simple, entire at the edges, tough and leathery, without stipules. The flowers are regular, growing on branching stalks, or in umbels, or in terminal spikes; usually having bracts, which are sometimes hooded, or hollow bags. The sepals of the calyx are from two to seven, generally leathery; the corolla is attached to the base of the ovary; in Marcgravia it is composed of one petal, hollow, cup-shaped; sometimes it is formed of five small petals, as in Norantea. The stamens are either of definite or indefinite number, inserted either on the receptacle or on a membrane at the base of the ovary; the filaments are dilated at the base; the anthers are attached by the base, long, two-celled, bursting inwards. The ovary is single, usually furrowed, three or many-celled, surmounted by a single style with a simple or capitate stigma; the ovules are numerous, attached to the projections of the central column. The fruit is at present imperfectly known, supposed to be generally succulent, but sometimes a capsule, leathery, and consisting of several valves which separate slightly, the partitions from the middle of each valve not reaching to the central column, the fruit becomes one-celled. The seeds are very small, numerous, imbedded in pulp, oblong, blunt at each end, straight or incurved, the outer skin hard and netted, with the scar at the side, without albumen.

This Order appears to have affinity with Hypericaceæ, but is still more closely allied to Clusiaceæ: the hooded bracts form a kind of link with the pitcher-plants.

Marcgravia (1) was so named in memory of Marcgraf, a German botanist, who made a voyage to Brazil in 1648. It is a sub-parasitical shrub, creeping over the stems of tall trees, with drooping divided branches terminated by umbels of flowers; the corolla is of one petal, which is conical, falling off soon; the stamens then become spreading; the sepals are six, the two outermost largest. The round germen has no style, but is crowned by the radiant stigma; the small shining seeds are enclosed in a succulent fruit full of soft red pulp. In the woods

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1. Marcgravia *umbellata*. West Indies.
   - 1A *Calyx.*
   - 1B *Ovary.*
2. Norantea *japurensis*. South America.
   - 2A *Flower and Bract.*
   - 2B *Bract.*
   - 2C *Bud, magnified.*
   - 2D *Pistil and Stamen.*
   - 2E *Stamen.*
3. Ruyschia *corallina*. South America.
   - 3A *Flower and Bract.*
   - 3B *Calyx and Pistil.*
   - 3C *Flower, magnified.*
   - 3D *Capsule.* 3E *Seed.*

of Jamaica it is frequent, assuming various aspects during the different periods of growth; the hollow bracts being the most remarkable feature. The stem, root, and leaves are said to be employed medicinally in the West Indies. M. *cuneifolia* has hooded bracts on three flower-stalks, like Norantea, the two other flower-stalks have none: it has also five petals instead of one hollow petal.

Norantea (2) is supposed to be called after its native name in Guiana, where it was discovered by Aublet, a French traveller of the last century. N. *japurensis* (2) is a parasitical shrub growing on the trees of the primæval forests on the shores of the River Japure; the membranous hollow bracts contain pellucid water; this species was found flowering in the month of January, others were in flower in June, from which it seems probable the plants flower twice in the year, as frequently occurs in the vegetation of the Tropics. N. *paraensis* is of nearly similar aspect with the rest, but the petals and calyx are purple, the bracts scarlet. N. *adamantinum* has small green flowers, on long stalks.

Ruyschia records the name of a celebrated Dutch botanist. Several species of the genus abound in South America; it is in some instances a tree, in others a shrub. R. *corallina* (3) is a parasite, sending out aerial roots from the joints of the stem, climbing on lofty trees in the hot, damp forests on the sandy shores of rivers in Brazil, and everywhere near the coast of the Pacific, in the tropical region of South America, extending to about twenty degrees of latitude north and south of the equator. It flowers in January, and at that time bears much resemblance to an orchideous plant. R. *amazonica*, of the shores of the Amazon River, has yellow petals with red bracts, and flowers in August. R. *Spixiana* was discovered by the Bavarian botanist Spix, in the interior of the province of Para, in the course of the Amazon, bearing its curious flowers abundantly in August. The modifications both of form and colour of the bracts of the plants of this tribe are very singular; in several instances, they have the appearance of the spur or nectary of some flowers, in others they are of a size and colour as to acquire the aspect of an actual flower, which is of comparative insignificance itself.

Equinoctial America is the region inhabited by this Tribe.

OF THE

VITACEÆ.

THE VINE TRIBE.

Climbing shrubs, with enlarged separable joints, and erect bushes; the woody tissue abounds with large dotted ducts, which at certain seasons pour forth sap in unusual quantity, popularly called the tears of the Vine. The leaves are either with or without stipules, the lower are opposite, the upper alternate, simple or compound. The flower-stalks are branching, sometimes undeveloped and changed to tendrils; the flowers are small, generally green; the calyx is minute, nearly entire at the edge; the petals are five or four, inserted on the outside of a disk surrounding the ovary, clinging together at the points, and shed whole in Vitis; distinct or united at the base as in Leea; in the bud they are often turned inward at the edge, and bent down at the point. The stamens are equal in number and opposite to the petals, inserted on the disk, sometimes imperfect; the filaments are distinct, or slightly cohering at the base in Leea, anthers ovate. The ovary is superior, from two to six celled, the style is single, very short, the stigma simple. The fruit is a pulpy berry, usually perfecting only one cell. The seeds four or five, occasionally none, bony and erect with hard albumen.

The petals being turned inward at the point is a remarkable character which connects this Order with umbelliferous plants.

Acid leaves and sweet fruit are the usual properties of the Vine tribe.

The Latin name Vitis is derived from the Celtic, thence the various European appellations. The grape-vine ranks highest in the class of fruits; it was among the earliest plants known to man, and the art of making wine was one of the first discoveries of the uses of those trees yielding fruit which were given to him "upon the face of all the earth." The vine grows wild about the shores of the Caspian Sea; Astracan is probably its northern limit in Asia. In very ancient times it was conveyed to Greece, thence to Sicily, and onwards to the south of France; the Romans planted it on the banks of the Rhine and the Moselle, where it still flourishes, to the utmost extent northwards, except in a few peculiar localities. In France it scarcely advances beyond 48° of north latitude. Although the grapes ripen further north, they do not acquire sufficient saccharine matter to produce

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1. Vitis *vinifera, Grape-vine.* Shores of the Caspian Sea.
   - 1A *Flower-bud.*
   - 1B *Petals, united and cast off.*
   - 1C *Petals cast, seen from above.*
   - 1D *Pistil and Stamens.*
   - 1E *Ovary.*
   - 1F *Seed.*
2. Cissus *quinquefolia, Virginian creeper.* North America.
   - 2A *Flower.*
   - 2B *Stamen.*

good wine. Vineyards were formerly cultivated in England with considerable success in favourable parts of the southern counties. The limit of the Vine region to the south is in Africa about 36° north latitude, reaching to 32° in Madeira, and as far as 12° in Asia, vineyards having been established by the French in Pondicherry. In the north-west provinces of India the vine thrives well; but in general the climate prevents converting the grapes into raisins or wine. On the Himalaya, in Kunawur, at 9000 or 10,000 feet, luxuriant vineyards exist, yielding both wine and raisins. In the valley of Cashmere at 5500 feet there are excellent vines. They are found also in China and Java. Beyond the equator, the region of the vine is chiefly in South Africa, from 24° south latitude, to the Cape of Good Hope, where extensive and productive vineyards are cultivated. In the New World there is a corresponding belt on either side the equator, though of less breadth than in the eastern hemisphere; in North America it includes the countries between 30° and 40° north latitude; but the progress of civilization is continually spreading the vine over a wider range. On the Andes of South America it grows at 7000 feet, in the region of Maize as elsewhere; in Brazil and Cumana it finds a suitable climate. From America, it has been transplanted to the Sandwich Isles, and from England to Australia. Numerous varieties of Vitis *vinifera* (1) afford valuable fruit, differing according to soil, situation, and other circumstances. The plants begin to bear fruit at two years, and are said to remain in vigour upwards of three centuries. The small black grape of Ascalon and Zante, formerly chiefly cultivated in the isthmus of Corinth, affords the dried fruit usually called *currants*. The white Ascalon is the Sultana raisin. Verjuice is obtained by pressure from unripe grapes; an oil is in some countries expressed from the seeds. There are, besides, several species of Vitis of comparatively little value: V. *vulpina*, the fox-grape, V. *labrusca*, and others belong to North America. In India, about fifty species have been discovered; V. *carnosa* grows chiefly on the plains, others on the hills. Cissus *quinquefolia* (2) is one of the most ornamental of climbers; the leaves, like so many American plants, changing to varied brilliant hues in autumn, amply compensate for the want of beauty in the flowers. C. *rosea*, and C. *capreolata* climb over trees on the Himalaya. C. *antarctica* is the Kangaroo vine of Australia. C. *cæsia*, the Sierra Leone grape; other species grow in the West Indies, some in Japan. The leaves of C. *tinctoria* yield a blue dye to the Indians of Brazil for their cottons. Pterisanthes is a curious plant, bearing innumerable flowers on a flat receptacle. Leea is an evergreen shrub, without tendrils, of little beauty, producing harmless berries; the root of L. *macrophylla* is astringent and mucilaginous; the different species belong to the East Indies and the Cape. Ampelopsis *Himalayana* is common on lofty trees at Mussooree and Simla.

This Tribe is found in greatest abundance in the East Indies, inhabiting chiefly woods on the hills; some species are dispersed over mild and hot countries in both hemispheres. None are natives of Europe.

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GERANIACEÆ.

THE GERANIUM TRIBE.

Undershrubs and herbaceous plants, the stems of which are enlarged at the joints, and separable when young. The leaves are mostly simple, the lower opposite, the upper alternate, with membranaceous stipules. The roots of some are tuberous. The calyx is formed of five persistent sepals, ribbed, more or less unequal, the lower sepal sometimes spurred at the base, or prolonged into a hollow nectary down the flower-stalk. The petals are five, seldom four, clawed at the base, twisted in the bud, equal or unequal, alternate with the sepals, attached to the ovary, or to the calyx. The stamens are usually united at the base in one set around the pistil, of the same number as the petals, or twice or thrice as many; the anthers are two-celled, opening lengthwise, some occasionally abortive. The ovary is composed of five carpels placed round a central column, to which the five styles cohere. The fruit is formed of five membranous carpels round the hardened beaked axis, separating and bending backwards when ripe by the elastic twisting of the styles: the seeds are solitary, without albumen.

The separable joints of this Order associate it with Vines; the united stamens, and the general habit connect it with the Mallow tribe.

All the plants are harmless, in general slightly acid, sometimes astringent, some secrete fragrant resin and essential oil.

Geranium, or Crane's-bill, was so named by the ancient Greeks, from the resemblance of the seed-vessel and its beak to the head of a crane. Nearly all the species are European herbaceous plants; G. *anemonefolium* of the Cape and Madeira is shrubby. G. *Robertianum* (1) is very common on banks and under hedges, frequently also growing amongst the mortar of old walls; the smell is disagreeable, but in autumn it is very striking from the leaves acquiring a bright red colour. G. *pratense* (2) is one of the most beautiful of the British species,

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1. Geranium *Robertianum, Herb Robert.* England.
   - 1A *Ovary and Pistil.*
   - 1B *Carpel.*
   - 1C *Seed.*
2. Geranium *pratense, Blue meadow Geranium.* England.
3. Pelargonium *peltatum, Ivy-leaved Stork's-bill.* Cape of Good Hope.
4. Pelargonium *tricolor, Three-coloured Stork's-bill.* Cape of Good Hope.
5. Pelargonium *zonale, Horse-shoe Stork's-bill.*
   - 5A *Carpels.*
   - 5B *Ovary and Pistil.*
   - 5C *Stamens.*
6. Erodium *cicutarium, Hemlock Heron's-bill.* England.
   - 6A *Carpel.*
   - 6B *Seed.*
7. Erodium *incarnatum, Flesh-coloured Heron's-bill.* Cape of Good Hope.

found chiefly in rather moist pastures and copses in hilly districts; like some other blue flowers, they occasionally vary to white. The roots of G. *maculatum* are considered useful as a medicine in Philadelphia, and the fleshy tubers of G. *parviflorum* are eaten in Tasmania, but the value of this tribe consists in the beauty of the flowers, especially of the Pelargonium genus, not in useful properties. Pelargonium, the Stork's-bill, affords the most favourite flower in the kingdom of Flora for the adorning of European gardens and houses, whither they have been transplanted, almost without exception, from the Cape of Good Hope. A great similarity prevails in their manner of growth, but the foliage as well as the flowers are of various shapes and hues, and countless varieties have been produced by cultivation. P. *zonale* (5) is the hardiest species in its nature, and can flourish even in the close air of cities: the tubular nectary extending along the flower-stalk is very obvious in this species. P. *odoratissimum* contains a considerable portion of essential oil, to which it owes its extreme fragrance; this has been obtained by distillation. The tubers of P. *hirtum* are eaten by the Arabs: those of P. *triste* are also thought eatable by the natives at the Cape. Erodium *cicutarium* (6) is a common plant on sandy ground near the sea, also on a chalky soil; the procumbent stems sometimes spreading far around. E. *moschatum* is less abundant, found chiefly in mountainous parts of Yorkshire and Westmorland, and cultivated in gardens for its scent of musk; both these species are aromatic. E. *incarnatum* (7) of the Cape affords an instance of an European genus developed into greater size and beauty in a hotter climate. Several species of Geranium and Erodium exist on mountains of tropical countries where the temperature is sufficiently moderate. They are also found on the Himalayas; G. *bicolor* occurs at the lowest elevations; others rise to an elevation of 7000 feet. E. *Himalayanum* grows in the northern portion of the Himalaya, and in Cashmere. The resinous secretion in some of the plants is very abundant; the stems of Sarcocaulon will burn like a torch, yielding an agreeable fragrant perfume during combustion. This curious genus differs from the rest in having spiny and fleshy branches.

This Tribe is distributed in unequal proportions over various parts of the world; Geranium and Erodium principally throughout the plains of the northern hemisphere, being found in Europe and North America; a few only extend to Siberia; some species belong to the mountains of Northern Asia. Pelargonium abounds chiefly at the Cape; a few have been discovered in New Holland, and some inhabit the Island of St. Helena.

OF THE

Day & Son Lith

CEDRELACEÆ.

THE MAHOGANY TRIBE.

Trees with a compact wood, usually sweet-scented, and finely veined. The leaves are alternate, pinnated, without stipules. The flowers are minute, growing on branching stalks, terminal, or from the base of the leaf-stalks: the calyx is four or five-cleft, the petals four or five. The stamens are from eight to ten, distinct, and fixed in honey-glands in Cedrela, united within a tubular nectary cup in Swietenia, inserted into a disk at the base of the ovary. The style and stigmas are simple. The cells of the ovary are equal in number to the petals, or fewer. The fruit is a capsule, with valves separable from the thick axis, splitting from the top in Cedrela, from the base in Swietenia. The seeds are flat, winged, placed in two rows on the valves, having thin albumen or none.

These trees have a close affinity with Meliaceæ, but are distinguished by their winged seeds: Flindersia and Chloroxylon, having their leaves dotted with pellucid glands, form a link with the Orange tribe.

Fragrant, close-grained, and astringent bark, are the two chief properties of this tribe.

Cedrela is a genus of trees remarkable for the length of the pinnated leaves; those of C. *serrata,* in the valleys of the Himalaya, have eighteen pair of leaflets, the whole being nearly three feet long, drooping in a graceful form; the flower-branches exceed them in length. The bark, leaves, and fruit have usually a disagreeable scent, but the wood is fragrant. Cedrela Toona (1), the Mahogany tree of India, has an erect trunk, attaining great height in favourable localities in Bengal; the light wood is extensively used for furniture throughout the Indian provinces, the trees being scattered widely as far as the base of the Himalaya. The leaves come forth with the flowers in February, and the seeds ripen in May; the astringent bark is employed as a remedy in fever. The bark of C. *febrifuga* is considered medicinal in Java. The young shoots of C. *augustifolia* are said to have a strong smell of garlic. C. *odorata,* having an extremely straight stem and a soft wood, furnishes canoes for the colony of Demerara: the Warani Indians, who inhabit the swamps between the rivers in the Delta of the Orinoco, are very

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1. Cedrela *Toona, Indian Mahogany-Tree.* East Indies.
   - 1A *Flower, magnified.*
   - 1B *Without the Petals.*
   - 1C *Seed-vessel.*
   - 1D *Open, magnified.*
   - 1E *Seed.*

2. Swietenia *Mahogani, Mahogany-Tree.* West Indies.
   - 2A *Flower, magnified.*
   - 2B *Stamens and Pistil.*
   - 2C *Seed-vessel.*
   - 2D *Seed.*
   - 2E *Section.*

expert in hollowing them out, frequently obtaining a canoe forty feet in length and six in width. One species of Cedrela grows in the vicinity of Pekin. Swietenia *Mahogani* (2) was named by Jacquin, in honour of Gerard von Swieten, who, by command of the Empress Maria Theresa, formed the Botanic Garden at Vienna. Ever since its introduction into Europe in 1724, it has been esteemed the most valuable timber-tree for various kinds of furniture, being of extreme durability, and capable of the finest polish; the wood of the branches is usually selected for ornamental small objects, on account of the beauty of the veining. The trees abounded formerly in the forests of Jamaica, and are still used there for beams and planks requiring strength; they are found also in St. Domingo, Honduras, and other parts of the West Indies. The Honduras Mahogany is not so highly valued in general as that of Jamaica, but the wavy veining and the brighter colour are very beautiful for some purposes, particularly for pianofortes; the value of a single tree is sometimes as high as 2000*l*. The felling of the trees constitutes the chief occupation of the natives, who are able to recognise them by the colour of the withering leaves in autumn at a great distance. After having collected a sufficient store, and conveyed them with much labour to the rivers, they are floated down to the coast for embarkation in ships. S. *febrifuga* of the East Indies affords a durable wood for the Hindoo temples: the bark yields a red dye. Soymida *febrifuga*, the Rohuna of Hindostan, and the Red-wood of Coromandel, is a valuable tonic in fever in India. The bark of Chickrassia *tabularis* is astringent without bitterness. Chloroxylon *Swietenia* is one of the trees which produces wood-oil in India, and is the well-known satin-wood of cabinet-makers. Oxleya *xanthoxyla* is a large tree in New South Wales, called by the natives yellow-wood. The Khlaya of Senegal, the common febrifuge in the fevers of the Gambia river, belongs also to this tribe. Flindersia of New Holland and Amboyna, and Chloroxylon of the East Indies, differ from the rest of these trees in having transparent glands in the leaves, containing essential oil.

The trees of this Tribe are common in the tropical regions of America and India. Cedrela and Swietenia grow on the Andes at an elevation of 1500 feet: they are rare in Africa and the adjoining islands.

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The Bead Tree Tribe.

MELIACEÆ.

THE BEAD-TREE TRIBE.

Trees and shrubs, the leaves of which are alternate, occasionally nearly opposite, simple or pinnate, without stipules. The flowers are sometimes imperfect in pistil and stamens; the sepals of the calyx are three, four, or five, partly united; the petals are of the same number, attached below the ovary, conniving or cohering at the base. The stamens are twice as many as the petals, the filaments cohering and forming a long tube, the anthers seated within the orifice of the tube, which is slightly expanded and notched. The disk is often very large, surrounding the ovary like a cup; the ovary is single, having usually as many cells as the number of the petals; the style is single; the stigmas distinct or combined. The fruit is a berry, or a drupe, or a dry capsule, often one-celled; the seeds are without wings; those of Melia and others contain fleshy albumen; those of Trichilia and a few more have none.

These trees have relation to the Soap-tree and Mahogany tribes.

Bitter, astringent, and tonic properties exist throughout the Tribe; a few species are poisonous.

Melia *Azedarach* (1) was not known to the ancients, but is now abundant in the countries of Europe, Asia, and Africa bounding the Mediterranean; it is a tree attaining the height of forty feet in the south of France and Italy; the foliage is graceful, and the flowers abundant and elegant; the tubular crown formed by the stamens is the peculiar character. The pulp of the fruit is poisonous, although some birds eat it without injurious effects. This is one of the few fruits, besides the Olive, which contain oil in the pulp instead of the seed, the usual receptacle of it; in the East it is used for burning in lamps, and for other domestic purposes. The ribbed seed is hard, and serves as beads for rosaries, on which account it is often planted in the court of a monastery, this use giving the name to the tribe: the root is bitter and nauseous, and is said to be employed medicinally in North America. M. *Azadirachta*, the Margosa, or Nym-tree of the East Indies, attains

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1. Melia *Azedarach*. *Bead-Tree.* Syria and South Europe.
   - 1A *Stamens.*
   - 1B *Pistil.*
   - 1C *Section of Fruit.*
2. Guarea *tuberculata*, *Tuberculated Guarea.* South America.
   - 2A *Fruit.*
   - 2B *Section.*
   - 2C *Section of Ovary.*
3. Turræa *lobata*, *Various-leaved Turræa.* East Indies.
   - 3A *Stamens and Pistil.*
4. Ekebergia *senegalensis*, *Flower.*
   - 4B *Fruit.*
   - 5A *Seed of* Ekebergia *indica.*

considerable dimensions, the branches stretching horizontally to a great distance; when planted around religious edifices, these trees form a valuable shade, and are of very striking effect. The bitter juice obtained from the stem and bark is one of the common medicines of Hindoo doctors; the pulp of the fruit yields oil like that of the former species, and is supposed to have properties rendering it medicinal. The leaves are used generally in India for poultices. Guarea (2), so called from the Cuban name, contains in the wood and bark a bitter resinous substance with the odour of musk; that of C. *grandifolia* is highly fragrant and valued as a perfume; in general, the wood is unfit for casks, as it has the property of imparting an extreme bitterness to the liquor contained in them. Trichilia has also a powerful scent of musk; T. *speciosa* yields a fragrant oil used as a remedy in rheumatism. T. *Catigoa* imparts a bright yellow colour to leather. Turræa (3), named after a botanist at Padua, is a genus belonging to the Islands of India. A few eatable fruits are found in this tribe. The *Langsat*, much esteemed in the Indian Archipelago for the cooling qualities of its watery pulp, is a species of Lansium, and the fruit, called by the natives *Ayer Ayer*, belongs to the same genus. Milnea *edulis*, of Silhet, is another plant affording eatable fruit. The aromatic roots of Sandoricum *indicum* are said to possess medicinal properties. The bark of Carapa *guianensis* is an esteemed fever remedy in Guiana; the oil of the fruit preserves iron from rust. C. *guineensis* yields the useful Kundah oil, which, though bitter and acrid, burns well in lamps. An odour of garlic occurring in Dysoxylon and Hartighsea is a connecting link with a few species of Cedrela in the Mahogany tribe; the Javanese use the fruit as garlic.

The plants of this Tribe are found in almost all parts of the world; most abundantly in Asia and America; Hartighsea exists in New Zealand; Melia Azedarach extends as far north as lat. 40°; beyond the Tropics the species are rare.

LIBRARY
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Aurantiaceæ

The Orange Tribe

AURANTIACEÆ.

THE ORANGE TRIBE.

Trees and shrubs, almost always having a smooth surface, and filled in all parts with little pellucid receptacles of volatile oil. The leaves are alternate, often compound, always articulated with the leaf-stalk, which is frequently winged; spines sometimes at the base of the leaf-stalk. The calyx is generally short, of a bell-shape, somewhat adhering to the disk, three or four toothed, and withering. The petals are from three to five, broad at the base, either distinct, or slightly combined, inserted on the outside of the disk of the ovary. The stamens are equal in number to the petals, or twice as many, or some multiple of their number, inserted on the same disk; their filaments are flattened at the base, sometimes distinct, sometimes slightly combined in one or several sets; the anthers are terminal, fixed in the slender summit. The ovary is many-celled, having one style surmounted by a slightly-divided stigma. The fruit is pulpy, with one or more cells, the thick rind sometimes separable from the cells, and full of receptacles of oil; the cells often filled with pulp. The seeds are attached to the axis, either numerous or solitary.

This tribe has several affinities with the Rue tribe, but the consolidated juicy fruit forms an obvious distinction.

The chief characters of the Orange tribe are, the abundant oily receptacles dispersed over all parts of the plant, leaves articulated with their stalks, and succulent pulpy fruit of a golden yellow colour, containing citric and malic acid in various proportions.

Citrus, being a striking genus of fruit trees dispersed over many parts of Asia, and extending through the provinces of Asia Minor, towards Greece, was early known to the ancients under various forms; yet none appear to have been cultivated by the Romans. It is supposed to have given the idea of the Golden apples of the Hesperides, and tradition even attributes the Forbidden fruit of the garden of Eden to one of its species. The numerous kinds of Citrus are remarkable for their bright evergreen foliage, highly odoriferous flowers, and brilliant, refreshing fruit, the rind of which is aromatic and bitter. C. *medica*, the citron (2), is said to have been first introduced into Europe from Media, and cultivated in Italy by Palladius in the second century. It is now grown throughout Southern

1. Citrus *aurantium, Sweet Orange.* China.
   1A *Cross-section of Fruit.*
   1B *Seed.*
2. Citrus *medica, Citron.* Asia.
3. Citrus *Limonum, Lemon.* Asia.
4. Cookia *punctata, Wampee.* China.
   4A *Calyx.*
   4B *Pistil.*
   4C *Stamen, magnified.*
   4D *Section of Fruit.*

Europe, and in the West Indies. The acidity of its large fruit renders it unfit for food until preserved with sugar. Plants of C. *aurantium*, the sweet orange (1), were brought to England in the reign of Queen Elizabeth, since which time it has been considered the favourite object of interest in conservatories, although of late years the great accession of exotics has in some degree displaced it. In Portugal and the Azores the climate is extremely favourable to it; the flowers continue to come forth during the summer, thus ripe fruit are mingled with them on the same tree, giving it a very beautiful appearance. The produce of fruit is most abundant: one tree has been known to bear 27,000 oranges in the year. C. *vulgaris*, the Seville orange, is distinguished for the extreme bitterness of its rind. C. *nobilis*, the Mandarin orange, is much eaten in China. The Kum-quat, C. *japonica*, is about the size of a gooseberry; a small quantity are preserved in sugar at Canton. Possessing the valuable property of ripening after being gathered, the orange is capable of being transported to a considerable distance, and thus enjoyed in its natural freshness by the inhabitants of colder climes. The perfumed oil known as Bergamot is obtained from the rind of a variety of orange grown at Bergamo in Italy. C. *Limonum*, the Lemon (3), ranks amongst the most valuable of all fruits, the sharp yet agreeable acidity of the juice making it available for various useful purposes. It is extensively cultivated in Sicily and other countries of the Mediterranean. C. *decumara*, the Shaddock, the pulp of which is pink; and C. *Limetta*, the Lime, are esteemed in the West Indies, where they have been introduced from China. Cookia *punctata* (4), the Wampee of China and the Isles of the Indian Archipelago, commemorates the name of Captain Cook. Ægle *Marmelos* is considered an exquisite and nutritious fruit by the Dutch in Ceylon; the root, leaves and bark afford medicine to the natives of Malabar, and the astringent rind yields a yellow dye, used by the Hindoos. Feronia *elephantum* is the elephant apple of Coromandel; an useful gum exudes from the bark, and the wood is hard and durable. Limonia *Laureola*, of the Himalaya, is the only species of this tribe known to inhabit lofty mountains, where the snow remains for some months of the year; its fragrant leaves are used in the religious ceremonies of the natives. Glycosmis and Triphasia both produce agreeable fruit.

Almost exclusively natives of the East Indies, whence some have spread over Tropical countries; two or three species belong to Madagascar; one is described from the forests of the Essequibo in South America.

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CAMELLIACEÆ.

THE CAMELLIA TRIBE.

✧

Trees and shrubs; the leaves of which are alternate, coriaceous, generally without stipules, usually undivided, occasionally with pellucid dots. The flower-stalks grow either from the base of the leaf-stalk, or at the ends of the branches, and are jointed at their base. The flowers are generally white, sometimes red. The sepals of the calyx are five, or seven, concave, coriaceous, soon falling off, the innermost often the largest. The petals are five, six, or nine, not always equal in number to the sepals; often combined at their base. The stamens are many, the filaments slender, united in one or many sets, or distinct; the anthers are two-celled, opening lengthwise; the ovary contains several cells, the styles are from three to seven, slender, more or less combined. The capsule is from two to seven-celled, opening when ripe in various ways; sometimes rough and leathery, and not gaping, usually with a central column, to which the few large seeds are attached.

The chief known properties of this tribe are, the abundant oil contained in the seeds, and the tonic astringency of Thea, combined with a fragrant and stimulating volatile principle.

Camellia, the type of this Order, was named after Camellus, a botanist who studied the plants of the Philippine Isles. C. *japonica* (2) and its numerous varieties are amongst the most admired of shrubs, as well in their native countries of Japan and China as in Europe. The form and hues of the shining evergreen foliage, and the delicate beauty of the white or red flowers, unite to render them peculiarly attractive. Some species of Camellia are valued for more important uses; C. *oleifera* (1) yields from its seeds an excellent oil, for the sake of which it is extensively cultivated in China. C. *Sasanqua* is remarkable for the aromatic fragrance of its leaf and flower-buds, which are sometimes added to tea in China. The leaves of C. *Kissi*, growing on the mountains of Nepal, at an elevation of 4000 feet, have also the flavour of tea; the flowers are small and white; the seeds contain a large proportion of oil.

But the most valuable genus of this tribe is Thea, the Tea-plant, two species

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1. Camellia *oleifera*, *Oil-seed Camellia*. China.
2. Camellia *japonica*, *Red Camellia*. Japan.
   2A *Seed-vessel*.
3. Kielmeyera *rosea*, *Rose-coloured Kielmeyera*. Brazil.
   3A *Stamen, magnified*.
   3B *Pistil*.
   3C *Cross-section of Ovary*.
   3D *Seed-vessel*.
4. Thea *Bohea*, *Black Tea-plant*. China.
5. Stuartia *pentagyna* (Malachodendron *ovatum*). North America.
   5A *Pistils and Stamen*.

of which, T. *Bohea* (4) and T. *viridis*, both in a wild and cultivated state, are spread over a wide district in Asia, extending from 17° to 31° of N. latitude in China, and in the Islands of Japan as far north as 41°. The tea plantations are generally situated on the lower fertile slopes of the hills; the shrubs yield three crops of leaves in the year, the gathering and manufacture of which employs an immense number of the Chinese; and the peasants in the Tea country have each their small tea plantation, as the English have their cabbage garden, and the Irish their potato field. In favourable localities in the Himalayas, the culture of Tea is now increasing with considerable success. The transportation of this curious preparation of a plant, so singularly restricted in its native place of growth, to all parts of the civilized world, forms a very valuable branch of commerce. T. *assamica* is a species of late years discovered in Assam, flourishing abundantly in the shade of dense forests, on the borders of rivers and lakes, and also on hills of 700 feet elevation. Its cultivation is already becoming a profitable object of labour, and in due time it may, in all probability, yield a plentiful addition to the stores of that innocuous and most grateful of vegetable productions, which by its diffusion in every land, seems mercifully destined to cheer and refresh all classes of mankind. The seeds of T. *oleosa* yield an oil much used in Canton and Macao for economical purposes. Kielmeyera is a genus inhabiting the region between 12° of S. latitude, and the tropic of Capricorn, in South America. K. *rosea* (3) is one of the most beautiful of the species, growing in open mountain fields, 3000 feet above the sea, in the province of Minas Geraes, in Brazil. The mucilaginous leaves of K. *speciosa* are used medicinally by the Brazilians. Ternstrœmia, Caraipa and others are found growing chiefly on the river banks of Guiana; some are tall trees with fragrant flowers. Anneslea *fragrans* is a tree of the East Indies, with smooth grey branches, and sweet-scented white flowers. Eurya *acuminata* grows on the Himalayas, at an elevation of 6500 feet, among Oaks and Rhododendrons. The bark of Gordonia is used for tanning in the United States. Some species exist in Jamaica.

The greatset portion of the finest trees and shrubs of this Tribe are to be found in South America, although those best known in Europe are from China and North America. A few only are natives of Asia; one belongs to Africa.

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Olacaceæ

The Olax Tribe

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OLACACEÆ.

THE OLAX TRIBE.

Trees and shrubs, often having spines. The leaves are alternate, simple, rarely compound, entire at the edges, without stipules; occasionally wanting. The flowers are small, growing from the base of the leaf-stalks, often sweet-scented; the calyx is small, entire or slightly toothed, often becoming enlarged and fleshy. The petals are four or six, somewhat leathery, attached to the base of the ovary, valvate in the bud, either altogether separate or cohering in pairs by means of the stamens; the central vein of the petals is usually hairy or furrowed. The stamens generally not all perfect; the imperfect are opposite the petals, to which they in part adhere; the perfect are alternate with the petals and cohere with them; the anthers are oblong, two-celled, and burst longitudinally. The ovary is free or partially adherent to the calyx, placed in a disk which is sometimes thickened and united with the calyx, one-celled, or imperfectly three or four-celled; containing one, two, or three ovules. The style is slender, the stigma simple, the fruit somewhat drupaceous, not gaping, often invested by the enlarged calyx, one-celled, and one-seeded; the seed is pendulous, and contains abundant fleshy albumen.

This small Tribe appears to have most affinity with the Orange and the Rue Tribes.

These plants are harmless; some are eatable.

Olax is said to have derived the name from the Greek for a *furrow*, such a line being generally found along the centre of the petals; others suppose it was adopted from the native name of *Mœla-hola* in Ceylon, signifying Salad-tree, Olax *zeylanica* being there used as a herb for salads, and esteemed for that purpose, although the wood has an unpleasant odour. Olax *stricta* (1) is of a stiff upright nature; the opened corolla shows the five imperfect rudiments of stamens besides the three perfect filaments bearing anthers. O. *scandens* is a climbing shrubby plant brought from the East Indies in 1820. O. *psittacorum* was named *Bois de Perroquet* by the French colonists in the Isle de Bourbon, from observing the extreme fondness of parrots for the fruit, which resembles an olive in size.

1. Olax *stricta*, *Upright Olax.*
   1A *Flower magnified.*
   1B *Flower opened.*
   1C *Ovary and Pistil.*
   1D *Fruit.*
   1E *Section.*

2. Heisteria *coccinea*, *Scarlet Heisteria.* West Indies.

3. Ximenia *Americana*, *American Ximenia.* America and Senegal.

4A. Apodytes *dimidiata.* *Flower opened.*
   4B *Ovary and Pistil.* 4C *Section of Ovary.*

Heisteria *coccinea* (2) is a native of the dense woods which border the rivers in the island of Martinique, flowering in February and March, and ripening the fruit in June. The effect then is very singular, the enlarged red calyxes remaining with the fruit, which is a favourite food of doves, but does not seem to be eaten by man. The trees attain a height of twenty feet, and are much branched ; the flowers are small and inconspicuous, scarcely visible amidst the large leaves at the base of which they grow. Ximenia *Americana* (3) is a tree bearing fruit like a plum in form, with a thin yellow pulp, of a sweet and subacid flavour, esteemed in Senegal by natives and children, but, like many of the inferior fruits of the Tropics, rough to the taste. The small white flowers are not of much beauty, but extremely fragrant, scenting the woods of St. Domingo, Carthagena, and Minas Geraes in Brazil, confirming the theory from experiments made by Schübler and Kohler, that white flowers are the most frequently odoriferous. Iacina *Senegalensis* forms a connecting link with the Orange Tribe, from its general habit of growth, and its glandular disk; the stem and branches are thorny, the fruit yellow when ripe, and of agreeable flavour.

The few trees and shrubs of this Tribe belong entirely to the Tropics, or those countries immediately adjoining; existing in the East Indies, Africa, South America, and New Holland; one only is known in the West Indies.

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Rutaceæ

The Rue Tribe

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RUTACEÆ.

THE RUE TRIBE.

Trees and shrubs, and some herbaceous plants: the leaves are opposite or alternate, simple or pinnate, covered with minute pellucid dots, without stipules. The flowers are on terminal stalks, or grow from the base of the leaf-stalks, are perfect, regular or irregular; the calyx has either four or five divisions; the petals are either as many as the divisions of the calyx and distinct, or combined into a monopetalous corolla, or occasionally absent. The stamens are equal in number to the petals, or twice or thrice as many, usually growing from the base of the ovary, placed outside the disk which surrounds it; either free or united with the base of the petals. The ovary is surmounted by a single style and a simple or dilated stigma. The fruit consists of several carpels cohering firmly, or more or less distinct; the seeds two or solitary; those of Ruta and its immediate allies contain albumen; those of Diosma and its allies have none.

The abundant oily receptacles of these plants connect them with the Orange tribe, but the dry separable fruit forms an obvious distinction.

An essential oil of powerful odour, and an extreme bitterness, are the prevailing properties of the Rue tribe.

The derivation of Ruta is unknown, but the name is nearly the same in all languages. Ruta *graveolens* (1) is a herb of ancient fame and repute for its medicinal qualities; in the time of Hippocrates it was highly esteemed; for many ages it was supposed to prevent contagion, and was called the herb of grace; in the days of Shakspeare it was considered emblematical of repentance, probably owing to its bitterness. The leaves have an exceedingly unpleasant odour, and an acrid taste; the petals vary from four to five. For medicinal use it is now, like many other European plants, superseded by foreign species: none possess any beauty of flower, except R. *albiflora* of the mountains of Nepal,

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1. Ruta *graveolens, Common Rue.* South Europe.
   - 1A *Flower.*
   - 1B *Ovary and Pistil.*
   - 1C *Stamen.*
2. Adenandra *uniflora, One-flowered Adenandra.* Cape of Good Hope.
   - 2A *Pistil, Stamens, and Nectaries.*
   - 2B *Seed-vessel.*
   - 2C *Section.*
3. Boronia *crenulata, Notched-leaved Boronia.* Australia.
   - 3A *Stamen.* 3B *Pistil and Nectaries.*
   - 3C *Leaf, magnified.*
4. Dictamnus *Fraxinella, Red Fraxinella.*
   - 4A *Seed-vessels.* Germany.
   - 4B *Carpel, open.* 4C *Seed.*
   - 4D *Glandular hairs, magnified.*
5. Erythrochiton *Brasiliensis, Brazilian Erythrochiton.* Brazil.

employed by the natives medicinally. R. *montana*, a Spanish plant, is so excessively acrid that it blisters the hands of those who gather it through the thickest gloves. Adenandra *uniflora* (2) was amongst the first plants brought from the Cape; the anthers are glandular, and between each is a stalked nectary; in many respects it closely resembles Diosma, a genus of plants called by the natives Bucku, partaking of the strong disagreeable scent peculiar to many of this tribe, but said to be thought agreeable by the Hottentots. Boronia *crenulata* (3) is one of the numerous species which abound in New Holland, of pleasing aspect, but little value for useful purposes. Dictamnus *Fraxinella* (4), a native of Germany, was early introduced to English gardens, and admired for its grateful aromatic odour, derived from the numerous glands containing volatile oil, especially on the flower-stalks; the root was formerly thought valuable as a medicine: this species is also a native of the Altai mountains. D. *Himalayanus* belongs to the Himalayas. Erythrochiton *Brasiliensis* was found by Martius in Brazil, consequently requires the protection of a hothouse in this climate. Several plants of this tribe are valuable for their febrifugal bark; Ticorea *febrifuga* is one of the most powerful remedies in the intermittent fevers of Brazil. The bark of Esenbeckia *febrifuga* is said to rival that of Cinchona, and is supposed to afford the medicines so much esteemed by the Brazilian miners. Hortia has nearly similar properties. A species of Galipea yields the famous bark known to the Spanish missionaries in Guiana for its beneficial effect in the most malignant fevers. The leaves of some plants in this tribe are made by infusion to supply both medicine and beverage; those of Ticorea *jasminiflora* are used for the former, those of Correa *alba* for a kind of tea by the colonists in New Holland. The leaves of Haplophyllum *tuberculatum* are employed by the women in Egypt to form a wash for the hair. It may be remarked of this tribe, as of several others so widely dispersed, that the species on the limits of its geographical distribution in cool climates, possess only slightly developed properties, and are of comparatively little value to man; whilst those plants which are natives of the hot regions have powerful properties, rendering them extremely valuable to the inhabitants of the countries where they grow.

This Tribe is dispersed in every quarter of the globe; some species extend over the southern portion of the Temperate zone, Ruta and Dictamnus advance into the south of Europe. Diosma and its immediate allies abound at the Cape of Good Hope; Boronia, Correa, and others, are natives of Australia; Cusparia and several more inhabit the equinoctial regions of America.

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The Quassia

SIMARUBACEÆ.

THE QUASSIA TRIBE.

Trees and shrubs; the leaves are alternate, usually compound, occasionally simple, without dots. The flowers are at the ends of the branches, or grow from the base of the leaf-stalk; the petals are green, whitish, or red; the stamens and pistils are sometimes in separate flowers. The calyx is small, thick, parted into four or five divisions at the top; the petals are of the same number, much longer than the calyx, generally combined into a tube at the base, spreading or twisted; usually of a greenish hue, white or red. The stamens are usually ten, each arising from the back of a hairy scale growing at the base of the pistil, five generally losing their anthers before the rest. The ovary is four or five lobed, placed on a stalk, from the base of which the stamens arise; it has four or five cells, each cell containing one ovule; the style is simple; the stigma occasionally four or five lobed. The fruit consists of four or five drupes arranged around a common receptacle, not gaping when ripe. The seeds are pendulous, with a membranous covering, and contain no albumen.

These plants have affinity with the Rue tribe, but may be readily distinguished by the want of dots in the leaves, and by the seed-vessels remaining closed.

An intense bitterness in all the parts is their chief characteristic.

The name Quassia was adopted from that of the Indian who first discovered the bitter qualities of these plants, and employed them successfully as a remedy in the fevers of Surinam. Simaruba *officinalis* (1), or Quassia *amara*, as it was formerly called, is a shrub ten feet high, with grey bark, of beautiful appearance when covered with its spikes of red flowers. It possesses the bitter property in an excessive degree, especially in the root, but combined with other qualities that are now supposed to render it injurious as medicine. Small cylindrical chips of the white root were at one period imported in considerable quantities from Surinam; of late years the traffic has diminished. An infusion of the flowers is still taken by the natives medicinally. The chief use of Quassia in this country is as a poison for flies and other insects; also as an illegal substitute for hops in making beer. Some botanical travellers have supposed the Quassia chips are obtained from Picrœna *excelsa;* that, however, appears to be of inferior quality. S. *amara*

1. Simaruba *officinalis, Bitter Quassia.* Guiana.
2. Samadera *indica, Indian Crown-Nut.* Sandy Shores of Malabar and Ceylon.
   2A *Flower.*
   2B *Fruit.* 2C *Nut.*
3A. Simaba *guianensis.* Guiana.
   Stamens and three of the Petals.
   3B *Pistil and two Stamens.*
   3C *Seed-vessels.*

is frequently used as medicine in the West Indies; the natives of Cayenne take a decoction of the bark as a common remedy in fever; the wood has the same properties, but less powerful; it is described by Sir Robert Schomburgk as similar to the White Pine. S. *versicolor*, called Paraiba by the Brazilians, is so exceedingly bitter that it is secure from the attacks of insects, not only in a fresh state, but even when dried in an herbarium. This bitter principle in plants appears to be one of the most perfectly retained, as may be observed in the common British *Wormwood*, on breaking or lightly moving portions of this herb after having been preserved in a dry state for many months, the minute particles ascend directly, and will be perceived in their full bitterness of flavour on the lips. It is said that the wood of this tribe is unfit for burning on account of the air becoming impregnated with a bitter smoke, and travellers have related that food cooked at a fire made of such fuel is unwholesome. Samadera *indica* (2), the *Kroon-nooten* of the Dutch traveller and naturalist, Van Rheede, affords the Niepa bark used by Indians as a febrifuge. The name is very descriptive of the growth of the cluster of fruit. The wood is white and bitter, as usual in this tribe; the bark black; the stem reaches about thirty-five feet in height. The petals are red above, yellow or white beneath. Each fruit contains one nut; the pulp is extremely bitter, and is considered good as medicine, although not as food. Nima *quassioides* is well known in northern India for its medicinal properties. Simaba (3), Brucea, and Sumatrana, in their qualities resemble Quassia.

The Tropics of Asia, Africa, and America, are the regions favourable to this Tribe; Nima belongs to the Himalayas.

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The Samyda Tr

SAMYDACEÆ.

THE SAMYDA TRIBE.

Trees and shrubs; the leaves are alternate, on short stalks, simple, entire at the edges or toothed, evergreen, with stipules at their base; usually having pellucid dots and small oblong lines. The flower-stalks grow from the base of the leaf-stalks, and are solitary or numerous; the calyx has four or five sepals more or less cohering at their base, usually coloured inside, and folded over each other in the bud; the petals are wanting. The stamens arise from the tube of the calyx, and are two, three, or four times as many as the sepals; the filaments are united at the base, and either all bear anthers, or are alternately shorter and surmounted by a tuft of hairs; the anthers are erect and ovate, two-celled. The ovary is above the calyx, one-celled; the style single and thread-like; the stigma capitate or slightly lobed; the ovules many, attached to plates on the sides of the ovary. The capsule is leathery, with one cell and three or five valves, many-seeded, the valves gaping imperfectly when ripe, often somewhat pulpy within. The seeds are fixed irregularly on the valves, with a fleshy fringed covering; they contain oily or fleshy albumen.

This small tribe has a few points of affinity with several others, but it is easily distinguished by the mingling of round and oblong pellucid dots on the leaves.

The bark and leaves have slightly astringent properties.

Samyda was named from the Greek of the Birch, which it resembles partly in the manner of growth of the branches; it was introduced into this country from the West Indies before the end of the last century, but it is seldom seen in our conservatories; the species are of slow growth and have not gained much favour, although graceful in habit and of delicately coloured foliage: the calyx of S. *rosea* (1) assumes the form and hue of petals, and gives a pleasing appearance to the plant. Casearia *grandiflora* (2) is one of the common plants of Brazil; the leaves are covered on the lower surface with a dense yellowish down, the prominent nerve is also downy on the upper surface; the calyx is clothed with yellowish hairs. This species has the largest flowers among the genus, but it does not rank high

1. Samyda *rosea*, *Rose-coloured Samyda*. West Indies.
2. Casearia *grandiflora*, *Large-flowered Casearia*. Minas Geraes, Brazil.
   - 2A *Portion of calyx, opened.*
   - 2B *Stamen.* 2C *Pistil.*
   - 2D *Section of Ovary.*
   - 2E *Seed-vessel.*
   - 2F *Seed and Aril.*
   - 2G *Section of Seed.*
3. Pitumba *guianensis*. Guiana.
   - 3A *Seed-vessel, opened.*
   - 3B *Section showing Seeds.*
   - 3C *Seed.*

for beauty of aspect. The alternate filaments bearing no anthers, appear to indicate affinity with the rays of the crown of Passion-flowers: the finely fringed aril of the seed is a curious appendage; the meadows of Minas Geraes afford a locality suitable to this species. In that part of the same province, called Distrito dos diamantes, on the rocks bounding the Rio Pardo, is found another species, C. *adamantinum*, the small ovate leaves of which are excessively hairy. C. *ulmifolia* is valued by the Brazilians as an antidote to the bite of poisonous snakes; they also boil the leaves to heal wounds, and employ the juice as a medicine. A decoction of C. *lingua* is used as a remedy in malignant fevers and other disorders. The acrid yet mucilaginous bark of C. *astringens* is also considered to have peculiarly healing properties. C. *Anavinga* yields a medicine from its pulpy fruit, and the bitter leaves are thought efficacious in baths. The root of C. *esculenta* is too bitter for food, but serves as medicine, and the foliage is eaten. Pitumba *guianensis* (3) is a small tree, seven or eight feet in height, growing on the margins of fields in Guiana: the Caribbean name, Pitumba-rana, was adopted by Aublet, one of the first French botanists who explored the country; the fruit contains many irregularly shaped seeds.

This Tribe belongs entirely to the Tropical regions of the world; the South American species are most abundant; those of Asia and Africa are few and little known.

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The Buckthorn Tribe.

RHAMNACEÆ.

THE BUCKTHORN TRIBE.

Trees and shrubs, which are often spiny; leaves simple, alternate, very seldom opposite, occasionally having minute stipules. Flowers small, generally green, growing either from the base of the leaf-stalk, or at the ends of the branches, sometimes not containing both stamens and pistils, the calyx is four or five cleft, the petals are distinct, hooded, or twisted, inserted into the orifice of the calyx, occasionally wanting. The stamens are five, placed opposite the petals, the fruit is fleshy and whole as in Rhamnus, or dry and separating into three divisions, as in Ceanothus, the seeds are erect with fleshy albumen.

The bark and berries of Rhamnus contain dyeing properties, as well as medicinal remedies.

This Order has affinity with Byttneriaceæ.

Rhamnus is supposed to be named from the old Celtic word *ram*, signifying branching, a derivation which may be traced in several modern languages; in old French it is called *reim*, and the arms of the city of Rheims are two branches intertwined. The berries of several species have medicinal properties, those of Rhamnus *Frangula* (1) are used in an unripe state for dyeing wool yellow and green; when ripe, they yield a blue colour: the bark also dyes yellow and black. The flowers are peculiarly grateful to bees; goats and sheep are fond of the leaves. The berries of R. *cathartica* yield likewise a yellow dye, as well as medicine; the ripe juice, when prepared with alum, is the sap green of painters; later in the autumn, a purple dye is obtained from them, the colouring matter apparently being influenced by the state of maturity of the fruit. R. *saxatilis* is one of the plants employed to dye morocco leather yellow. R. *virgatus* grows plentifully on the Himalaya, and would doubtless yield from its abundant berries a valuable dye to the natives. R. *Alaternus* is a hardy evergreen shrub, common in European gardens, the glossy foliage forming rapidly a close and sheltering hedge; the honey-bearing flowers are much frequented by bees. The wood of several species is compact and durable, that of R. *lycioides* is selected by the Mongols to make their images, on account of its hardness and orange red colour.

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1. Rhamnus *Frangula, Alder Buckthorn.*
   1A *Berry.* England.
   1B *Seed.*
2. Zizyphus *lotus, Lote-tree.* Africa.
3. Paliurus *australis, Christ's-Thorn.* South Europe.
   3A *Flower, magnified.*
   3B *Seed-vessel.*
4. Ceanothus *azurea, Blue Ceanothus.* Mexico.
   4A *Flower without the Stamens.*
   4B *Pistil and Stamens.*
5A. *Section of Fruit of* Zizyphus *Baclei.*

Zizyphus derives its name from the Arabic, the fruit is destitute of any strong medicinal qualities, and is often eatable and wholesome. *Z. Lotus* (2) is the true Lotus fruit of the Lotophagi, and is still eaten by the Arabs of Barbary. Travellers in Africa have found it growing in different countries; Mungo Park describes the fruit as delicious, and relates the manner in which the natives made a kind of bread of the dried and pounded fruit, separating the farinaceous portion from the stone, mixing it with water, and making it into thin cakes, which when dried in the sun resemble gingerbread in flavour and colour. From the fruit of *Z. Jujuba* and *Z. vulgaris* the well-known Jujube lozenges for coughs are prepared. The berries of several other species are eaten by the natives of India and China; those of *Z. Baclei* are considered poisonous by the Negroes of the Gambia, but they make a kind of wine from the fruit of *Z. orthocanthus*.

Paliurus *australis* (3) is a remarkably beautiful tree, the pliant branches with their strong thorns and delicate flowers bending gracefully downwards; the singular shape of the seed-vessel has caused it to be named by the French *porte-chapeau*. It is generally believed to be the plant of which Christ's crown of thorns was made, as it abounds in Judea, and from the nature of the branches is peculiarly fitted to be woven into any form.

Ceanothus is a genus named by Theophrastus; *C. americana* is called New Jersey Tea, from the leaves being dried and used as Tea in Carolina; the root yields a buff dye for wool. Two species of Berchemia are employed medicinally by the Chinese. The acrid root of Discaria *febrifuga* affords a remedy in the fevers of Brazil. Hovenia *dulcis* is remarkable for the enlarged and esculent flower-stalks, which after the petals are fallen, become filled with a red pulp, and are esteemed as a fruit in China. Sageretia *Theezans* has aromatic leaves which serve as Tea to the poor Chinese.

This Tribe is found in nearly every part of the world, except in the Arctic Zone. The largest portion is said to be dispersed through the hottest countries of the United States, the south of Europe, the north of Africa, Persia, India, the Cape of Good Hope, and New Holland. A few genera appear to be limited to particular countries, as Ceanothus to N. America, Phylica to the Cape, Cryptandra and Pomaderris to New Holland.

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TEREBINTHACEÆ.

THE TURPENTINE-TREE TRIBE.

Trees and shrubs abounding with resinous gummy sap, or a milky caustic juice; the leaves are alternate, simple or compound, without stipules, and having no pellucid dots. The flowers grow either at the ends of the branches or from the base of the leaf-stalk. The stamens and pistil are seldom perfect in the same flower; the calyx is usually small and persistent, with five or seven divisions; sometimes the sepals are united, and it falls off. The petals are equal in number to the segments of the calyx, attached to its fleshy disk, occasionally wanting. The stamens are equal in number to the petals and alternate with them, growing separately from the disk, or cohering at their base when the disk is absent. The ovary is generally one-celled, having an ovule attached to its base by a cord; it is surmounted by one style, or three or four, and as many stigmas. The fruit is most commonly a drupe; the seed contains no albumen.

This Tribe has some affinity with the Walnut tribe, although the flowers are disposed differently.

A resinous, acrid, and extremely poisonous juice prevails in these plants.

Pistacia *Terebinthus* (1) is the tree which yields the celebrated Cypress Turpentine, a limpid balsamic resin, remarkable for its fragrance. Incisions being made in the bark, the turpentine exudes during the night, and is collected in the morning before sunrise; the produce is extremely small, consequently it is very costly, and it is liable to be mixed with other turpentine. P. *Lentiscus* affords the more abundant Mastick, which, flowing from transverse wounds made in the trunk, concretes on the ground, and is gathered up for use; it was formerly much employed as a medicine, and is still esteemed by the Turks and Armenians. P. *atlantica* yields the same kind of resin. The fruit of P. *vera* is the eatable Pistacia-nut, once much used in cookery, but now of little value. Anacardium *occidentale* (2) is a curious example of an apparent fruit formed by an enlarged fleshy stalk. The name was given on account of the heart-shape of the nut which is attached to the end, and remains without exterior covering. Between the shell

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1. Pistacia *Terebinthus*, *Turpentine Tree.*
   1A *Seed.* South Europe.
2. Anacardium *occidentale*, *Cashew Nut.*
   2A *Section of Seed.* West Indies.
3. Mangifera *indica*, *Mango Tree.* East Indies.
4. Melanorrhœa *usitata*, *Varnish Tree.*
   4A *Section of Fruit.* Martaban.

5A. Pistacia *atlantica*. *Pistil flower.*
   5B *Ovary and Pistil.*
6A. Pistacia *vera*. *Section of Seed.*
7A. Rhus *lasiocarpa*. *Fruit.*
8A. Melanorrhœa *glabra*. *Calyx.*
   8B *Flower.* 8C *Stamen.*
   8D *Ovary and Pistil.*

and the kernel there is a thick caustic oil, blistering the skin if incautiously touched: the natives use it for preserving wood from decay; the fresh kernels are of delicious flavour when young; in an older state, they are generally roasted, and if mixed with cocoa, make an excellent chocolate. The pulpy part, or apple, has an agreeable acid taste, and is eaten in the West Indies either fresh or roasted; the juice is fermented for wine, or distilled for a spirit. From the stem a milky liquid is obtained, which marks linen with an indelible black; also a fine semi-transparent gum exudes from the bark. Spondias, a Greek name for Plum, is applied to a genus bearing eatable fruit called Hog-plums in the West Indies; the thin yellow pulp covering the large fibrous stone has a sweet scent and not unpleasant flavour. Cuttings of these trees grow so readily, that in St. Domingo hedges made of them take root and produce flowers and fruit in the course of a few months. S. *dulcis* is cultivated in the islands of the Pacific Ocean for the sake of the fruit, and is known as the Otaheite Apple. Mangifera (3), or Mango, the native name, is a large spreading tree, producing one of the most esteemed fruits of the East. In this country, we know it only in a green state, pickled. When fully ripe, the soft pulp is filled with an agreeable and wholesome juice; the fruit as well as the shell within is of a kidney shape; in size and quality, it varies as much as the European apple. Among the drawings of the late Mr. Longcroft, already alluded to, a Mango Grove, near Lahore, gives a noble idea of these majestic trees. Melanorrhœa (4) is described by Dr. Wallich as one of the most valuable trees of the East, forming, together with Teak and Saul, extensive forests. The stem attains thirty or forty feet before branching; it contains throughout a thick viscid grey juice, which on exposure to the air changes to black; one tree yields about 12lbs. in the year. This abundant and cheap varnish is employed either pure or coloured for all kinds of boats, and for vessels to contain anything liquid or solid; it is besides much used by the Burmese in gilding their idols, and for religious writings on ivory. The points of the calyx remaining united, it falls off, after which the petals expand and enlarge considerably; as the seed ripens, they acquire a brown colour. Semecarpus and other genera yield also a valuable varnish in Silhet and China. Schinus is a very graceful shrub, with slender pinnated leaves, growing near the shore in Teneriffe, and on the Andes at an elevation of 8000 feet. Rhus is most known in Europe as the *Sumach*, an alteration of its Arabic name. R. *vernix* is the Japanese varnish with which almost everything is coated in Japan.

The Tropics are the chief station of the Tribe. Pistacia inhabits the south of Europe and the Levant. Rhus is most extensively dispersed, being found in Northern India, in South Africa, in North America, and south of Europe. Duvaua and Schinus belong to Chile; no species have yet been discovered in Australia.

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LEGUMINOSÆ.

THE PEA TRIBE.

Trees, shrubs, and herbaceous plants, of extremely various aspect. The leaves are alternate, generally compound, having a pair of stipules at the base of the leaf-stalk, and at each leaflet. The flowers are usually papilionaceous, some are spreading and regular; the calyx is below the ovary, five parted, often unequally so, the odd segment placed in front. The petals are five, inserted into the base of the calyx, the upper one forming the standard, the one on either side the wings, the two lower combined into the keel, enclosing the stamens and pistil. The stamens are of definite or indefinite number, usually attached to the calyx, either distinct or united into one or two sets, very rarely into three. The pistil is simple, one-celled, one or many-seeded, commonly consisting of a single carpel, occasionally of more; the style and stigma are simple. The fruit is a legume, or a drupe, as in Dipterix (11); the seeds are fixed to the upper seam, solitary or several, without albumen.

This Tribe has most affinity with Rosaceæ; the position of the odd lobe of the calyx and the leguminous seed-vessel are distinguishing characters.

This remarkable Tribe is amongst the most important to man, contributing a large portion of embellishment to the earth, yielding excellent timber, the most useful of all dyes, indigo and logwood, bark for tanning, gums, resins, balsams, medicines, and although in general containing deleterious juices, yet many species afford an abundant supply of wholesome nutriment in the pulse of the seeds to men and animals. The seed-vessel is developed in diverse forms of pod: in some of the South American trees it is of enormous size and solid woody substance; when ripe, bursting, and the large seeds falling to the ground with considerable noise. Pisum *sativum* (1) is of ancient renown and extended use throughout Europe. Trifolium (2) was known to the Greeks, and has ever been esteemed as food for cattle. Several kinds of Vetch are valuable as fodder. Spartium (3) is one of the most ornamental of European shrubs, adorning the wildest ground with its

1. Pisum *sativum, Eatable Pea.* S. Europe.
2. Trifolium *pratense, Purple Clover.* Britain.
3. Spartium *scoparium, Common Broom.* Britain.
4. Tetragonolobus *edulis, Winged Pea.* Sicily.
5. Robinia *hispida, Rose Acacia.* Carolina.
   5A *Flower, separated.*
6. Alexandra *imperatricis.* Guiana.
   6A *Section of Ovary.*
7. Acacia *Sophoræ.* Tasmania.
   7A *Stamen Flower.* 7B *Stamen.*
8. Cassia *Australis.* Australia.
   8A *Stamen.* 8B *Pistil.*
9. Wistaria *sinensis.* China.
10. Clitoria *Ternatea.* Moluccas.
11. *Drupe of* Dipterix *Tonga, Fragrant Tonga Bean.*
12. *Seed-vessel of* Medicago *lupulina.*

golden flowers, rivalled only by the still more hardy Ulex, the Furze, which is, however, of more limited distribution. The species of Spartium called *Retama*, nine feet in height, covers the sandy ridges of the Peak of Teneriffe at an elevation of 9000 feet, until the barren pumice and lava impede vegetation; the flowers are highly odoriferous, and the fine brown goats that feed on it are considered of very superior quality. The Winged Pea (4) was formerly eaten by the peasants of Sicily and Spain. Robinia *hispida* (5) is a beautiful, but very fragile shrub; a variety with tougher branches is extremely ornamental to the public walks of many German towns. R. *pseudacacia*, the Locust-tree of North America, is much planted here for the sake of its wood, which is said to last one hundred years as gate-posts. Acacia *Sophoræ* (7) belongs to an extensive genus, with small spreading flowers, having the stamens and pistil separated, yielding gums, delicious perfumes, and astringent bark in Arabia and Egypt. Some species afford useful wood. The compound leaves of these shrubs have a peculiar tendency to diminish, gradually falling away, till the apparent leaves are in reality only the expanded leaf-stalk, as in A. *Sophoræ*. The chief vegetation of the Arabian Deserts belongs to this Tribe, Acacia *vera* and *arabica* exuding the well-known gum; Alhagi, the Camel's thorn, and other low, thorny, balsamiferous shrubs, are scattered over the scorched dreary tracts. Mimosa *sensitiva* and *pudica* possess an extraordinary irritability, when touched at the top of the leaflets each pair closes in succession. Cassia (8) is a genus comprising the medicinal Senna, the product principally of African species. Among the lofty trees, one of the most striking is Alexandra (6), discovered by Sir Robert Schomburgk on the shores of the Cuyuni in Guiana: the graceful stem attains 120 feet in height, and the rich dark foliage, thickly interspersed with brilliant flowers, has a very splendid appearance: the pod is nearly two feet in length, and the seed as large as a chesnut. Wistaria (9) has now become acclimatised in England, producing its countless blossoms in spring on the leafless branches, which can be led horizontally to the extent of eighty feet from the stem. The seeds of Ceratonia *siliqua*, the Carat-tree of the East, are said to have furnished the original carat weight for jewels; they are now used as food for horses in Spain. Gum Tragacanth of Syria and Persia is produced by several shrubby thorny kinds of Astralagus, a genus of which only herbaceous species are natives of England. Crotalaria *juncea* furnishes the coarse Bengal hemp for canvas bags. The wood of Hymenea *Courbaril* of South America is of the heaviest class, a cubic foot weighing 100 lbs., whilst that of Laburnum, although fine-grained, weighs only 52 lbs. Among the useful roots of these plants, that of Glycyrrhiza *Liquoricc*, is included. Indigo is now chiefly grown in South America, but is of great antquity in the East Indies; an ancient Sanscrit writing mentions "the vat of a dyer filled with indigo, a jackal falling into it was coloured blue."

This Tribe is distributed in unequal proportions in every part of the known world, except in the Isles of St. Helena and Tristan d'Acunha: in the Tropics more than 1600 species have been discovered; thence the numbers gradually diminish north and south: the largest portion are natives of South America: in the countries bordering the Mediterranean a considerable number exist.

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Engelhardtia

by Walnut Tribe

Day & Son, Lith.

JUGLANDACEÆ.

THE WALNUT TRIBE.

Trees, with a watery or resinous juice. Leaves alternate, pinnate, generally without dots, and have no stipules. Flowers herbaceous, inconspicuous, and imperfect; those having stamens only grow in catkins from the branches of the preceding year; the fruit-bearing flowers grow at the ends of the young branches, either in small clusters, or in long racemes; in some cases the two kinds of flowers are mingled in one panicle. The calyx of the staminiferous flowers has two, three, or six membranous unequal divisions at the top, with a scale-like bract at the base. The stamens are three, or many, with short free filaments, and erect, two-celled anthers. The small terminal clusters of fertile flowers of Juglans are surrounded by a few small bracts. Those of Engelhardtia grow in long loose racemes, each flower being enclosed in an involucre, cup-shaped at the base, and united to the calyx, acquiring at last wing-like expansions. The calyx adheres to the ovary excepting at the top, where it is divided into three or five segments, which fall away as the fruit increases. The corolla is formed of very minute petals, or is altogether wanting. The styles are sometimes two, very short, the stigmas seldom more than four, unequal, fringed, occasionally placed on the ovary without a style. The fruit is a drupe of one stone, that of Juglans is naked, that of Engelhardtia enclosed in an adherent involucre. The outer covering usually separates from the stone, which has two or four cells at the base, one at the top.

This order has some connexion with the Cashew-nut tribe, through Pistacia, and has also affinity with the Oak, and Hazel-nut, in points of structure.

Juglans was greatly esteemed in ancient times, and is said to have been named *Jovis glans*, the nut of Jove, on account of its excellence. The native country of Juglans *regia*, the Walnut (1), is Persia, but it has long since been introduced into all European countries, producing fruit in perfection, particularly in Holland, and the Rhine country of Germany, where it is extensively cultivated, both as a fruit and timber tree. The outer portion of the fruit is thick and soft, having acrid and astringent properties; whilst young, and before the inner shell of the kernel is hardened, the whole is made into a pickle; when ripe, the green covering, which contains an extremely black juice, is taken off, the inner shell divides into two valves, showing the large irregularly lobed nut, covered with a thin brown

1. Juglans *regia*, *Common Walnut*. Persia.
1A *Section of a fertile Flower.*
1B *Flower, with Stamens.*

2. Engelhardtia *aceriflora*, *Maple-flowered Engelhardtia*. Java.
2A *Involucre, containing the Fruit.*
2B *Fruit, magnified.*

skin; when the nut is split, the embryo of the future plant is distinctly seen at the summit. From the kernel is expressed an oil of a very drying nature, which is valuable to painters in oil; in France it is also used in cooking; and a very large quantity is prepared in Cashmere, where it serves for burning in lamps.

The wood of the walnut-tree is light and strong, and is thought ornamental in cabinet work, in Germany and France; when polished, it acquires a rich brown colour. Various species of Juglans abound in North America.

Engelhardtia was named after a Dutch governor of Java, where it was first discovered; several species are now known; the wood of some is resinous; that of E. *spicata* is extremely hard; in Java, cart-wheels are cut out of a single horizontal slab. Engelhardtia *aceriflora* (2) is a tall tree in the woods of the mountains of Bantam, in Java. The fruit is small, enveloped in the involucre, and of no value. E. *Roxburghiana* grows in the forests of Silhet, and affords a valuable wood to turners; the bark, containing much tannin, is used by the natives of India in tanning leather.

Carya affords the different kinds of Hickory in North America, yielding both fruit and timber. The nuts of Carya *sulcata*, the shell-bark Hickory, are large and well flavoured. C. *glabra*, the Hog-nut, is called also Broom-Hickory, durable brooms being made with slender slips of the tough wood. C. *olivæformis*, the Pekan nut, is considered delicious. The bitter nuts of C. *amara* are combined with oil and taken medicinally.

Pterocarya *Caucasica* is a hardy tree, its elegant foliage resembling that of the Ash.

The trees comprised in this small Tribe are chiefly natives of North America; a few belong to Asia. Juglans *regia* inhabits the woods of Persia and Cashmere. Engelhardtia forms some of the loftiest forest trees in Java, Borneo, Sumatra, and other islands of the Indian Ocean; some species are thinly scattered over the East Indies, from Singapore to Nepal. Pterocarya is a native of Caucasus. One species is known in the West Indian Islands.

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ROSACEÆ.

THE ROSE TRIBE.

Shrubs and herbaceous plants. The leaves are simple or compound, alternate, often having a pair of stipules at their base, occasionally dotted. The flowers vary in form and size, and are variously arranged, occasionally imperfect. The calyx is three, four, or five-lobed, with a disk either lining the tube or surrounding the orifice; the fifth lobe placed next the stem. In the true Roses the calyx tube becomes fleshy and covers the fruit; in Potentilla and others it remains herbaceous, and the fruit is a mass of Achenia. The stamens are of definite number, or many, arising from the calyx, curved inwards in the bud; the anthers are two-celled, bursting lengthwise; occasionally one-celled, bursting transversely. The ovaries are above the calyx, solitary or several, one-celled, sometimes cohering. The styles are many or single, stigmas compound or simple. The fruit is various, containing a one-seeded nut, or seeds fixed in pulp, or a capsule with several seeds; the seeds have no albumen.

This tribe has close affinity with the Apple and Almond tribes; but the fruit clearly distinguishes each.

Astringent tonic juices and wholesome fruits are the characteristics of these plants.

Rosa, the Rose, has the same name in all languages, and from time immemorial has been considered pre-eminent for beauty of form and colour, and fragrant scent. Various species abound in Europe and Asia, and countless varieties have been produced by cultivation: in a wild state the flower has only five petals, but they are readily multiplied. Those which adorn our hedges are either pink or white; in Austria and the north of Italy, as well as near Cortona and elsewhere, a yellow Rose is abundant. Rose-bushes are liable to the attacks of an insect, which punctures the bark and causes the growth of rose-galls and mossy tufts on the stalks. R. *canina* (1) is a beautiful ornament of hedgerows in June; the astringent fruit is used medicinally; in Germany it is made into a conserve, and eaten with

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1. Rosa *canina, Dog or Hep Rose.* Britain.
   - 1A *Section of Fruit.*
   - 1B *Seed.*
2. Rosa *punicea, Scarlet Briar Rose.* Austria.
3. Rosa *bracteata, the Macartney Rose.* China.
4. Rosa *gallica, Officinal Rose.* S. Europe.
5. Spirea *filipendula, Drop-wort.* Chalk Downs, England.
6. Rubus *fruticosus, Bramble or Blackberry.* Britain.
   - 6A *Section of Fruit.*
   - 6B *Seed.*
7. Sieversia *elata, Tall Sieversia.* Himalayas.
8. Fragaria *vesca, Wood Strawberry.* Britain.
   - 8A *Section of Fruit.*
   - 8B *Stamen.* 8C *Carpel.*
   - 8D *Achenia, with its Seed.*

roast meat. R. *rubiginosa*, Sweet-briar or Eglantine, grows on gravel or chalk soil here and on the Continent, and for its delightful fragrance is admitted into every garden. R. *bracteata* (3) is the finest of white Roses, with glossy foliage, and simple flower of extremely delicate perfume; it was brought from China by Lord Macartney, and is become acclimatized in this country. The petals of R. *gallica* (4) are not so highly scented as those of some other species, but they have astringent tonic properties, and are employed as medicine. The celebrated Attar of Roses of the East is extracted from the petals of R. *moschata* and R. *damascena*. No native Rose exists on the plains of India, but on the Himalayas several species are found; one of the most beautiful is R. *Lyelli*, with double white flowers; some climb to the tops of lofty trees, adorning them with their elegant branches. Rubus *fruticosus* (6) is the well-known Bramble, common in many countries in rough places and hedges; the Blackberry is the most abundant at least of our native fruits, although not much esteemed; it is a native also of Cashmere. R. *idæus*, the Raspberry, grows in woods and hedges in the north of England; the fruit is of good flavour, but it has been much improved by cultivation, particularly in Holland. The leaves of R. *arcticus* are used in the most northern countries as tea. The fruit of R. *chamæmorus* and others, is thought to possess medicinal properties; the root of R. *villosa* is used in North America. Fragaria affords one of the most wholesome and agreeable of fruits. F. *vesca* (8) and F. *elatior* are the two British species; from these many varieties have been raised, as well as from F. *Virginiana*, the Scarlet Strawberry, imported from North America more than two centuries ago. F. *rubicola* affords a grateful fruit to the natives of the Himalayas. The dried roots of Spirea *filipendula* (5) afford a mealy substitute for bread to the poor Laplanders. S. *Ulmaria* is one of the most graceful of British plants, very plentiful in moist meadows, by the side of ditches and streams in Kent and in the Midland counties, or wherever the damp valleys afford a suitable locality, as in Westmoreland. The flowers have an aromatic scent, and it well deserves the title of "Queen of the Meadow." Dryas is one of this tribe which advances farthest to the north, being found within the Arctic regions; it grows on hills in the Craven district of Yorkshire, and in the Scotch Highlands; the seeds being tipped with the long feathery styles, have a singular appearance in autumn. Agrimonia yields a yellow dye, once used for nankeen; A. *Nepalensis* represents the genus on the Himalayas. Poterium and Sanguisorba have heads of small flowers without petals; both are occasionally cultivated for fodder, and known as Burnet. The roots of Gillenia *trifoliata* are employed as Ipecacuanha in the United States. Brayera *anthelmintica* possesses extremely powerful properties. In the Feroe Isles, Tormentilla root is used for tanning. Sieversia is dispersed on the Swiss Alps, in Kamtschatka and Melville Isle. S. *elata* (7) belongs to the mountains of Asia. Quillaia *saponaria* contains a saponaceous secretion in the bark, which makes it useful as soap in South America.

This Tribe inhabits chiefly the Temperate or cold climates of the northern hemisphere; a few species are natives of high land within the Tropics; several belong to the Himalayas; a few only to South America. Rubus *Jamaicensis* is the only example in the West Indies. The apetalous plants represent the Tribe at the Cape of Good Hope.

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Pomaceæ

The Apple Tribe

Day & Son, Lith.

POMACEÆ.

THE APPLE TRIBE.

TREES and shrubs. The leaves are alternate, simple or compound, with stipules. The flowers are solitary, or in terminal clusters, usually white or pink; the calyx is adherent, five-toothed, the odd segment placed behind. The petals are five, clawed at the base, inserted into the calyx, the odd petal placed in front. The stamens are of indefinite number, inserted in a ring in the calyx. The ovaries are from one to five, adhering more or less to the sides of the calyx and to each other; the styles are from one to five, the stigmas simple; the fruit is one to five-celled, the seeds solitary, without albumen.

The Apple tribe is closely allied to the Rose tribe, but is distinguished by the fruit being a fleshy pome, and the seeds placed side by side, instead of one over the other.

Beautiful flowers and eatable fruit are the chief characteristics of this Tribe. Pears contain small stony concretions in their cellular substance.

Pyrus, Pear, and Apple are names derived from the Celtic; the fruits were cultivated by the Greeks and Romans; the varieties have been exceedingly increased since those times, but all have been derived from Pyrus *Malus* (1), the original stock. The juice of the wild apple or crab, in its natural state, is extremely sour and austere; as verjuice it serves some useful purposes. The apple is the most valuable fruit grown in Britain; and it attains to great perfection in this country, being suited to various soils and situations, thriving as far north as the Shetland Isles: the climate of America is also very favourable to it. The various uses to which apples are applied render them of much importance. Cider is made from the fermented juice of the sharp and strong-flavoured kinds, chiefly in the counties bordering the Bristol Channel. P. *communis*, the Pear, is frequent in Sussex and other parts of England. The wild fruit is of no value; but all the delicious pears of gardens have been produced from it by grafting and cultivation. Some kinds in France and the north of Italy are of very superior quality: they also thrive in still hotter climates, for

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1. Pyrus *Malus, Apple or Crab-Tree.* Britain.
   1A *Fruit.*
   1B *Section.*
2. Crataegus *Oxycantha, Common Hawthorn.*
   2A *Stamens and Pistils.* England.
   2B *Stamens.* 2C *Seed.*
   Mespilus *Germanica, Eatable Medlar.* Germany.
   3A *Pistils and Stamens.*
   3B *Fruit.*
4. Cydonia *vulgaris, Common Quince.* Cydon, Crete.
5. Cydonia *Japonica, Japan Quince.* Japan.
6. Eriobotrya *Japonica, Loquat.* Japan.
7. Cotoneaster *microphylla, Small-leaved Cotoneaster.* Nepal.

Marco Polo relates, that he found in the market of Ningpo "uncommonly large pears, weighing each ten pounds, white in the inside, and very fragrant." The pears of Peshawur, in India, are also celebrated. Perry, made of the juice of pears, is considered a very delicate kind of wine. The orchards are principally in Worcestershire, and the arms of the city of Worcester are three pears. P. *torminalis*, the wild Service-tree, is frequent in parks and hedges in Sussex; the clusters of small oval fruit are sometimes gathered, and sold in village shops: after having been slightly touched by frost, they have an agreeable acid flavour. P. *domestica* is found occasionally in the hilly woods of Cornwall, and is the only native species in Iceland; it is of slow growth, bearing no fruit till it arrives at a considerable age. P. *aucuparia*, Mountain-ash, or Rowan-tree, is supposed to have been one of the sacred trees of the Druids, and was long afterwards an object of superstitious veneration in Scotland. In many parts of Germany it takes the place of Plum-trees by the roadside; and as there are no hedge boundaries to the extensive fields, it adds considerably to the beauty of the scene, especially when the abundant scarlet berries adorn the trees. The bark is useful in tanning, and a strong spirit is distilled from the fruit. P. *aria*, the white Beam-tree, named from the use made of the wood, is a native of chalk and limestone hills in Scotland and Ireland; it may be easily recognised by the white cottony down of the under surface of the leaves. The wood of nearly all the species of Pyrus is hard, and fine-grained. Cratægus is the genus of the tribe to which we are most indebted for the embellishment of our fields, parks, and gardens. C. *Oxycantha* (2) merits its general admiration from the picturesque form of growth, as well as beautiful spring flowers, and red haws in autumn, which in mild seasons sometimes remain on the branches throughout the winter. The fruit of C. *azarolus*, and C. *odoratissimus*, is eaten in the Crimea. C. *crus-galli*, the cockspur thorn, shows very clearly the transformation of leaves and undeveloped branches into spines; those on the young branches are only soft and leafy, on the branches of the previous year they are become hard spines. Mespilus (3) affords a remarkable instance of a fruit not being eatable until in a state of incipient decay: the cells of the fruit are of a singular bony consistency, and the leafy calyx remains unclosed at the top. M. *pyracantha* is a favourite evergreen shrub from the south of Europe. Cydonia *vulgaris* (4) bears a fruit of peculiar flavour; the mucilaginous seeds are used medicinally. Cydonia (formerly called Pyrus) *Japonica* (5) has fruit about the size of a walnut in Japan. Eriobotrya (6) is downy on the flower branches; the fruit is said to resemble the Mango in taste, and is esteemed in its native country. Cotoneaster (7) is a genus belonging to Europe and Nepal; the stalks are usually clothed with cottony down. Photinia *dubia* yields a red dye for cotton, in Nepal.

This Tribe is found plentifully in Europe, Northern Asia, the mountains of Nepal, and North America; it is rare in Mexico, exists in Africa only on the northern shore, is unknown in Madeira, as well as in the whole southern hemisphere; a solitary species belongs to the Sandwich Isles.

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On stone by J. Tribe.

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AMYGDALACEÆ.

THE ALMOND TRIBE.

Trees and shrubs; the leaves are simple, alternate, usually having small glands towards the base; the stipules are simple, mostly glandular. The flowers are either single or in umbels; the calyx is five-toothed, lined with a disk, deciduous, the fifth lobe next the stem or axis, as in the Rose tribe: the petals are five, placed on the calyx. The stamens are about twenty, arising from the throat of the calyx, curved inwards in the bud; the anthers are two-celled, bursting longitudinally. The ovary is above the base of the flower, simple, one-celled; the style is terminal, with a furrow on one side, terminating in a kidney-shaped stigma. In Chrysobalanus and its allies the style proceeds from the base of the ovary. The fruit is a drupe, the pulpy substance sometimes separating spontaneously from the shell; the seed is generally solitary, suspended in the shell, contains no albumen.

This Tribe is distinguished from the Rose and Apple tribes by the fruit being a simple drupe, by the secretion of prussic acid, and by the bark exuding gum; the latter property shows affinity with Mimosa amongst the Leguminous plants.

Amygdalus was so named by the Greeks, the fruit being cultivated and esteemed in ancient times throughout the Levant. During the last three centuries, the Almond-tree (1) has been constantly planted in English shrubberies, it is abundant in all the southern countries of Europe. The best sweet almonds are produced in the neighbourhood of Malaga, the kernels contain a fixed oil, which renders them pleasant to the taste, as well as useful for some medicinal purposes. A. *amara*, the bitter almond, has less oil, and possesses narcotic and poisonous qualities, owing to a considerable portion of prussic acid; the bitter principle is not in the oil, but in the substance left after the oil has been expressed. A. *microphylla* is found on the hot dry plains of Mexico; a species named A. *cochinchinensis* is said to be a native of woods in China. Persica *vulgaris* (2) was brought to Europe from Persia, and about 1562 was first cultivated in England; in Lombardy, Peach-trees are planted in the vineyards, and serve as supports to the vines, which hang in festoons between them; the large juicy fruit is one of the most

1. Amygdalus *communis*, *Sweet Almond.* Barbary.
   1A *Shell.* 1B *Kernel.* 1C *Section.*
2. Persica *vulgaris*, *Common Peach.* Persia.
   2A *Stone.*
3. Cerasus *Laurocerasus*, *Common Laurel* Levant.
4. Prunus *spinosa*, *Sloe*, *or Blackthorn.* England.
5. Cerasus *avium*, *Wild Cherry.* England.
   5A *Stone.* 5B *Section.*
6. Prunus *domestica*, *Golden Drop*, *cultivated.*
7. Prunus *domestica*, *Orleans Plum*, *cultivated.*
8. *Stone of* Chrysobalanus *Icaco.*

delicious both in flavour and substance, although, even when ripe, it contains a less proportion of sugar then most of the stone fruits. P. *lævis*, the Nectarine, ranks next to, and belongs to the same countries as the Peach, and is chiefly distinguished by having a smooth instead of a downy skin; both flourish remarkably in a small island in the Persian Gulf, together with Almonds and several other fruits not belonging to this tribe. Cerasus *Laurocerasus* (3) is amongst the most beautiful of evergreen shrubs; it was introduced from Constantinople, and has now become very hardy in our climate: all parts contain poison; the oil obtained is extremely virulent, and is said to be still more so in Brazil than in Temperate regions; the vapour is sufficient to destroy insect life. C. *avium* (5) is supposed to be the origin of our cultivated Cherries, several varieties now abound here, and on the Continent, and are of much value; a large-fruited kind in the Black Forest, and in the Vosges, yields the German Kirschenwasser. The leaves of the Cherry-tree are folded simply flat when young; those of the Plum are rolled inwards. C. *Padus*, the British Bird-cherry, bears flowers in long spikes; the fruit is nauseous to man, though eaten by birds. C. *Puddum*, of the Himalayas, bears pink flowers, the fruit is small but delicious, and is employed for making cherry-brandy, the wood is used in Nepal for walking-sticks by the Fakeers. C. *undulata* and C. *cornuta* grow on mountains in India; the leaves of C. *capricida* are poisonous to goats. Prunus *spinosa* (4) is a rigid shrub with branches ending in a spine, the astringent fruit is not eatable until wrinkled by frost, then only cooked with sugar; the juice is used to adulterate Port wine, and the leaves for the same purpose with Tea. P. *domestica* affords several varieties of cultivated Plum, some of which are of excellent quality and extensively used; when dried, they are usually called by the French name of Prunes; an immense number are prepared annually in France and Portugal; in some parts of Saxony the highways are bordered by Plum-trees, supplying Sweden with the favourite winter fruit. P. *armeniaca*, the Apricot, has an extensive range over the East, especially on the high lands; it exists also between the Niger and the Atlas mountains in Africa, and abounds on the mountains of Caucasus; along the banks of the Sutledge and other rivers of Bokhara it flourishes, with many other stone fruits; on the Hindoo-koosh the traveller may pass many miles through orchards of Apricot-trees, where the fruit attains the greatest perfection. The chemical changes which operate in the ripening process of fruits is singularly shown in apricots; in a green state, scarcely a trace of sugar is found, but when ripe, there is a considerable quantity, while the malic acid is diminished one-third. Chrysobalanus differs from the usual type of this Order in having irregular petals and stamens; a style from the base of the ovary, and a stone with five angles. The fruit of C. *Icaco*, the Cocoa-plum (8) is eaten in the West Indies; that of C. *luteus* in Sierra Leone, where the Gray-plum Parinarium *excelsum* also affords food to the natives.

This Tribe belongs to the cold and Temperate regions of the northern hemisphere, with very few exceptions; Chrysobalanus and its allies are natives of the tropics of Africa and America.

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Lythraceæ

The Loosestrife Tribe

LYTHRACEÆ.

THE LOOSESTRIFE TRIBE.

Almost all herbaceous plants, a few only shrubs. The branches are frequently quadrangular. Leaves opposite, seldom alternate, entire, without either stipules or glands, sometimes with glandular dots. Flowers solitary, or in clusters, regular, or irregular, growing from the base of the leaf-stalk, or in terminal spikes or racemes as the upper leaves diminish. The calyx is tubular, ribbed and plaited, often oblique; some of the lobes are in many cases longer than the rest. The petals are inserted between the outer lobes of the calyx, very soon falling off, sometimes wanting. The stamens are fixed in the tube of the calyx, below the petals, to which they are either equal in number, or twice, or even four times as many; the anthers are two-celled opening longitudinally. The style is slender; the stigma usually capitate. The capsule is membranous, covered by the calyx, gaping when ripe, containing numerous small seeds.

This Order has most affinity with the Saxifrage tribe.

Lythrum *Salicaria* (1) is esteemed one of the most elegant of British plants; it grows frequently on the banks of rivers and streams, the tall spikes of bright purple flowers rising to the height of four or five feet; in dry situations, the plant becomes more downy and of shorter stature. The whole plant has astringent properties, which have rendered it useful in medicine and in tanning. Lythrum *hyssopifolium* is not so common a species, being found only in a few places in England, and is of smaller growth and less beautiful aspect.

Peplis *Portula* (2) grows generally in watery places, on heaths, on sandy soils, with a prostrate stem, creeping or floating; the minute petals of the solitary flowers are generally concealed within the bell-shaped plaited calyx.

Lagerstrœmia (3) was so named by Linnæus, after Lagerstrœm of Gottenburg, who obtained many rare plants from the East. It forms, with a few other plants, a division of this tribe distinguished by having the seeds winged. All the species are fine shrubs of the East Indies, China, and South America. Lagerstrœmia *reginæ* is a very beautiful evergreen shrub, bearing long panicles of rose-coloured

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1. Lythrum *Salicaria*, *Purple Loosestrife*. River banks, England.
   - 1A *Calyx and Pistil.*
   - 1B *Calyx and Stamens.*
   - 1C *Pistil.*
   - 1D *Section of Seed-vessel.*
2. Peplis *Portula*, *Water Purslane*. England.
   - 2A *Flower.*
   - 2B *Flower, magnified.*
   - 2C *Section of Seed-vessel.*
3. Lagerstrœmia *indica*, *Indian Lagerstrœmia*. East Indies.
4. Cuphea *tubiflora*, *Tubular-flowered Cuphea*. South America.

flowers, which deepen in hue during the day till they become purple by evening; the bark and leaves are considered medicinal, and the seeds are narcotic.

Cuphea (4) is a genus of South America; several species are now cultivated in English gardens as ornamental flowers. Cuphea *Balsamona* is found to be a valuable remedy in the intermittent fevers of Brazil. Heimia *salicifolia*, a Mexican plant, is remarkable for having yellow flowers in the midst of this usually purple-flowered tribe. Lawsonia *inermis*, the Hinna of Egypt, yields an orange dye, employed by the women of Oriental countries to stain their fingers and feet; it is also used for dyeing morocco leather, and various other purposes. In India, it is much cultivated north of the Jumna river. The bright red flowers of Grislea *tomentosa* yield a dye to the natives of India. The wood of Physocalymma *floribunda* is of a fine rose colour, and forms the favourite Rosewood of Germany and Portugal. The leaves of Ammannia *vesicatoria* are so extremely acrid as to be used for blisters in India. Pemphis *acidula* inhabits exclusively the coasts of tropical Asia, where the leaves are said to be cooked and eaten by the inhabitants.

This Tribe is dispersed in various countries. Lythrum, like many other plants which grow in watery situations, extends over a wide range of the globe, being found in Europe, America, Asia, and Australia. L. *Cashmerianum* inhabits the shores of the Lake of Cashmere. L. *Salicaria* is found in New Holland, although at present no other species of this tribe has been discovered there. Grislea belongs to India, China, and South America; Ammannia to the hot countries of both hemispheres. Rotala, Pemphis, and Ameletia are spread over the peninsula of India and the islands of the Indian Ocean. Lagerstrœmia and its allies are all natives of India or South America.

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TAMARISCINEÆ.
The Tamarisk Tribe.

TAMARICACEÆ.

THE TAMARISK TRIBE.

Shrubs or herbs, with slender branches; leaves alternate, minute, entire, scale-like, usually having hollows on the surface. Flowers in close spikes, or racemes. The calyx is four or five-parted, persistent, imbricated in the bud. Petals inserted into the base of the calyx, withering and remaining whilst the seed ripens. Stamens either equal in number to the petals, or twice as many, distinct or united: the anthers are turned inwards, two-celled, opening longitudinally. The ovary is free, surmounted by three styles. The fruit is a capsule, three-valved, three-cornered, one-celled, containing many seeds attached to three plates, either at the base of the cavity, or along the middle of the valves; the seeds have no albumen, and are surmounted by down.

Bitter and astringent properties exist in the plants of this innocuous tribe; sulphate of soda is contained in the ashes.

Tamarisk is supposed to have received its name from the Tamarisci, who in ancient times inhabited the Spanish side of the Pyrenees, where it grows plentifully on the banks of the Tanaris. Saline air or soil is essential to the growth of the different species. T. *gallica* (1) is now become naturalized in England, and may frequently be seen on the south coast, being almost the only shrub that grows well in gardens exposed to the spray of the sea; when protected by a wall or house it attains the height of twenty or thirty feet, and has a stem upwards of twelve inches in circumference. The flowers are abundant in warm situations, coming forth in June and September; in mild parts of the Hampshire, Sussex, and Cornish coast, it flourishes as luxuriantly as in its native country of Normandy, where it is particularly beautiful along the road from Pontorson to Mont St. Michel, forming high hedges with its elegant branches adorned with pink flowers, to the extreme edge of the sands. In former ages it would not have been found there, but it sprang up in its appointed time and place, when the salt waves had taken possession of the wide tract of meadow and forest, and the poor monk on returning from a pilgrimage beheld in amazement a vast barren sand intervening

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1. Tamarix *Gallica, French Tamarisk.* South Coast, England.
   - 1A *Flower.*
   - 1B *Ovary and Pistil.*
   - 1C *Branch and Leaves.*
2. Myricaria *Germanica, German Tamarisk.*
   - 2A *Flower.* Germany.
   - 2B *Stamens and Pistil.*
   - 2C *Seed-vessel.*
   - 2D *Seed.*
   - 2E *Branch and Leaves.*
3. Myricaria *bracteata, Bracteated Tamarisk.*
   - 3A *Flower.* Himalayas.
   - 3B *Stamens.*

between him and his monastery on the rocky mount. The twigs of T. *gallica* and T. *Africana* are considered slightly tonic, the ashes of both yield a remarkable quantity of sulphate of soda. The celebrated Manna of Mount Sinai was discovered by Ehrenberg to be an exudation from T. *mannifera*, caused by a small insect of the Coccus tribe, which sometimes covers the larger branches; the substance contains no crystallisable Mannite, but consists entirely of pure mucilaginous sugar—a singular fact in plants which grow only in saline situations. Persian Manna is derived from another species. The steep water-courses of Pesheen in Beloochistan are as favourable localities for Tamarisk as the shores of Europe; in Delhi and other parts of India T. *indica*, T. *dioica*, T. *Furas*, and T. *orientalis* are all valued for their astringent qualities both in medicine and in dyeing. T. *articulata* is a native of Egypt.

Myricaria is so called after the Greek name of the Tamarisk, from which it differs only in a few points; it is dispersed in Europe and Asia. M. *Germanica* (2) is a small shrub growing on the banks of Alpine rivers and streams in Silesia and Moravia, and among the Hartz mountains; it is well adapted to English gardens, making a pleasing contrast with larger and brighter foliage; it was formerly employed medicinally on account of its astringent balsamic bark. M. *bracteata* (3) belongs to the salt districts of Kunawur in the Himalaya; the bracts at the base of the flower-stalks fall off when the flowers expand. M. *elegans* is also a native of that country. M. *herbacea* affords a kind of tea to the Mongols, as well as tonic medicine.

The plants of this small Tribe are limited exclusively to the eastern portion of the northern hemisphere, extending from China to the Cape de Verd Islands and Senegambia; apparently not reaching southwards beyond 8° or 9° of N. latitude, or northwards beyond 55° in Siberia. They occur in various localities, on the sea-coasts and river-shores of Europe, on the banks of the Ganges and the Nile, on the arid sandy tracts of Northern India and the Punjaub, and on the lofty saline plains of Thibet and Siberia. They exist in the greatest variety and abundance in the region of the Mediterranean Sea.

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Melastoma malabathricum

Fine Melastoma fruit

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MELASTOMACEÆ.

THE MELASTOMA TRIBE.

Trees, shrubs, and herbaceous plants. Leaves opposite, undivided, usually entire at the edges, without dots, and with several strong ribs running from the base to the point. The flowers have a calyx of four, five, or six lobes, cohering more or less with the angles of the ovary. The petals are equal in number to the segments of the calyx, rising from the base, or from the edge of a disk that lines the calyx; in the bud state they are twisted. The stamens are generally twice as many as the petals, sometimes of the same number; the filaments are curved downwards in the bud; the anthers are long, two-celled, usually bursting by two pores at the point, and lengthened in various ways beyond the insertion of the filaments; sometimes they open longitudinally; before the flowers expand they lie in cavities between the ovary and the sides of the calyx. The ovary is partly united with the calyx, and contains several cells; the style is single with a simple stigma; a cup is often present at the top of the ovary, surrounding the style. The seed-vessel is either dry and distinct from the calyx, or succulent and combined with it; it has many cells, in which are numerous minute seeds, usually having appendages of some kind.

Melastomaceæ have most affinity with the Myrtle tribe, from which they differ in the petals being twisted in the bud, and in the leaves having no dots.

A slight astringency is the prevailing character of this extensive tribe, which throughout its whole range contains no unwholesome plant. Nevertheless, there are none of much importance to man, either as food or medicine, or for domestic uses; yet several of their genera were, on their first discovery, named after distinguished naturalists of various countries. The succulent fruit of many species is eatable, that of some is filled with a juicy pulp, which stains the mouth black in eating; whence the name of Melastoma is derived. In some plants this juice is of so intense a black as to be used for ink in Guiana. The leaves of Melastoma *malabathrica* (1) are used to dye cottons black in India, and are also considered medicinal. In Brazil, both wine and vinegar are prepared from the fermented

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1. Melastoma *malabathrica*, *Black Strawberry-Tree.* East Indies.
   1A *Stamen.*
2. Blakea *trinervia*, *Three-ribbed Blakea.*
   2A *Calyx and Pistil.* Jamaica.
3. Pleroma *viminea*, *Twiggy Pleroma.* Brazil.
   3A *Stamen.*
4. Sonerila *tenera*, *Delicate Sonerila.* Himalaya.
   4A *Seed-vessel.*
5. Osbeckia *sinensis*, *Chinese Osbeckia.* China.
6. Stenodon *suberosus.* *Section of Fruit.*
7. *Stamen of* Medinilla *radicans.*
   7A *Section of Seed.*

berries of several species. From the down of the leaves of M. *holosericeum* a kind of tinder is made in Panama, large quantities of which are sent to Havannah. The aromatic leaves of M. *Theæzans* are employed for tea in Popayan, and are preferred to Chinese tea. Blakea *trinervia* (2), so named after Blake, the great naturalist of Antigua in the last century, is one of the most beautiful plants of the West Indies. At first it is slender, and supports itself by some neighbouring tree; afterwards becomes robust, and sends forth numerous branches and delicate rose-coloured flowers. The stamens are united at their base, forming a ring around the pistil. The fruit is a yellow berry, about the size of a gooseberry, of pleasant flavour, and eaten by the natives of Guiana.

Osbeckia was named by Linnæus in honour of his countryman, Osbeck, a celebrated author of scientific works, and traveller in China and the East Indies. O. *sinensis* (5) is a pretty little species brought from China in 1818; its leaves have emollient properties. The fruit of O. *Principis* is used for a black dye in Brazil. Sonerila *tenera* (4) is one of the five genera peculiar to Asia; it extends beyond the general Tropical limits of this tribe, being found on the Deyra Doon, and in other districts of the Himalaya, during the rainy season; but of diminished size in those northern localities. Sonerila differs from other genera in this order, in having all its parts of fructification arranged in a ternary manner. The pulpy fruit of Memecylon *edule* is eaten by the natives of Coromandel, although it is too astringent to be agreeable food; the leaves afford a yellow dye, as well as those of Miconia *tinctoria*, Cremanium *tinctorium*, and other species. Blakea *parasitica* yields a red dye. The fruit of Lasiandra *argentea*, Tococa *guianensis*, and others, give a deep black hue to cotton. The bark of Medinilla yields an emollient juice; some species produce numerous bright purple flowers on the stem, and are highly ornamental. The acid leaves of Astronia *papetaria* are cooked as sauce for fish in the islands of the Malay Archipelago; the wood is hard and used for posts. The berries of Tristemma *virusanum* are employed medicinally in the Mauritius; those of Myrrhinium *atropurpureum* are of agreeable flavour. Macaco wood is obtained from Tococo *guianensis*, the fruit of which is eaten by man, but is particularly relished by monkeys.

This Tribe is, with few exceptions, limited to the equinoctial regions of the globe, and chiefly to the tropics of South America, where about 650 species have been found; on the Andes they ascend to 11,000 feet. Nearly an eighth portion of the genera occur in Asia; Sonerila and four others have not yet been discovered in any other quarter of the world; the various species inhabit principally the southern parts of India, a few only extend into the northern provinces. Some species are found in China; a very few are at present known in New Holland. None have been discovered in Africa north of the Desert of Sahara, nor beyond the Tropic of Capricorn on the south. Melastoma and Osbeckia are natives of Asia, Africa, and America: none belong to Europe.

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The Myrtle Tribe

MYRTACEÆ.

THE MYRTLE TRIBE.

Trees and shrubs, no herbaceous plants. Leaves opposite, entire, usually having transparent dots, and a vein running parallel with the margin. The flowers are various in form, but grow usually from the base of the leafstalk; they are red, white, occasionally yellow, never blue. The calyx is adherent, four or five cleft at the top, sometimes cohering together at the points, and falling off like a cap, as in Eucalyptus. The petals are equal in number to the divisions of the calyx. Stamens either twice as many as the petals, or numerous, rarely of the same number; the filaments are distinct, or connected in several sets, curved inwards before flowering; the anthers are ovate, two-celled, opening lengthwise. The ovary is from one to six celled, the style simple. The fruit is either dry or fleshy, entire or gaping; the seeds are usually of indefinite number, and variable in form.

This is one of the most clearly defined of the natural orders of plants, and very easily recognised. The opposite leaves without stipules, with a smooth edge and a marginal vein being sure indications of it. It is closely connected with Rosaceæ, Melastomaceæ, and others, but is obviously distinguishable from all. Nearly all are highly aromatic, from an oil contained in the pores of the leaves. Some curious transformations of petals and sepals occur in this tribe.

Myrtus (1) was known to and named by the ancient Greeks, and retains the same derivation in all European languages. It was a celebrated plant in Athens, employed as a symbol of honour in victory, and of justice for judges, and dedicated to Venus on account of its beauty and aromatic fragrance. The berries were added to wine, used in cookery, and in medicine for their astringent properties. The buds are still eaten as pepper in Tuscany, and the bark is used for tanning. It was long ago brought to England, and now flourishes in the southern counties in great luxuriance, particularly on the coast, the air of the sea being remarkably favourable to it, as was observed anciently in Greece. M. *tomentosa* yields eatable berries on the Neilgherries. M. *nummularia* is the smallest plant of this tribe, spreading over the ground in the Falkland Isles.

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1. Myrtus *communis*, *Common Myrtle*. Persia and S. Europe.
   1A *Section of Ovary*. 1B *Seed*.
2. Eucalyptus *pulverulenta*, *Powdery Gum-tree*. New Holland.
3. Eucalyptus *macrocarpa*. Swan River.
   3A *Seed-vessel*.
4. Psidium *Cattleyanum*, *Purple Guava*. South America.
5. Punica *Granatum*, *Pomegranate*. S. Europe.
6. Eugenia *Malaccensis*, *Malay Rose-apple*. East Indies.
7. Leptospermum *scoparium*, *New Zealand Tea Plant*. New Zealand.

Eucalyptus *pulverulenta* (2) and E. *macrocarpa* (3) are examples of the Gum trees of Australia, where they rank amongst the loftiest timber trees; the stems of some species rising in a straight column to the height of 150 feet before branching; the foliage is of a singular grey hue, the same on both surfaces, forming a striking contrast with the bright glossy leaves of the European Myrtle. The flowers have no petals; the united calyx, being separated from the top of the cup by the force of the expanding stamens, falls off like a cap. A valuable kind of Tannin is prepared from the bark of several species, and is said to be much more powerful than that of Oak. E. *resinifera* of New South Wales yields an efficacious gum resin. E. *mannifera* exudes a sweet substance resembling Manna, in the dry season. E. *robusta* has cavities in the stem containing a fine red gum. Another species furnishes a copious juice which ferments like beer, and is considered a refreshing beverage by the inhabitants of Tasmania. The different kinds of Psidium, or *Guava*, afford a pleasant fruit in the West Indies, that of P. *Cattleyanum* (4) is esteemed the best flavoured. The dark curled-grained wood of P. *montanum* is much valued for ornamental uses. Punica is said by Pliny to have been so named from having been found growing abundantly on the shores of Carthage. It was early celebrated for the medicinal properties of the fruit in Persia, where it forms extensive woods. In Europe it is still employed medically; the fruit is considered delicious in the East. Eugenia was named after Prince Eugene of Savoy, a great patron of botany. E. *Malaccensis* (6) is much cultivated in the Malay Isles for the sake of its agreeable fruit, which has the fragrance of a rose; several species bearing eatable fruit grow in South America; Allspice is the dried fruit of E. Pimento. Leptospermum *scoparium* abounds on the shores of many parts of Australia and New Zealand, where it was found by Captain Cook; the leaves, having a pleasant bitter flavour, were used by his crew as tea. The seed-vessel is of a remarkable vase shape (7). Nearly all the species of Metrosideros are evergreen shrubs of Australia, where the hard wood is of much value. M. *buxifolia*, the aki of New Zealand, is a rambling shrub climbing by means of its side rootlets to the top of the highest forest trees in the Bay of Islands. Cajeput oil, valued for its stimulant properties, is distilled from the leaves of Melaleuca *Cayaputi* of the Moluccas. The dried flower-buds of Caryophyllus *aromaticus* are the spice Cloves.

The plants of this Tribe are dispersed in Tropical and other hot countries; a great number are natives of the East Indies and South America; in Chile, they grow to the height of 2000 feet on the Andes; at the Equator, the region of Myrtaceæ ascends to upwards of 5000 feet; many genera are peculiar to Australia and the South Sea Isles. Sonneratia and Careya belong exclusively to India and its islands. Psidium and Eugenia are natives equally of Asia and America. Metrosideros *augustifolia* and a very few others are found in Africa; M. *lucida* extends as far south as Lord Auckland's Isles. Myrtus is a widely dispersed genus, found at the Straits of Magellan, in Peru, and on the mountains of India. M. *communis* is the most northern species, having become naturalized in South Europe.

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Lecythideæ.

The Lecythis Tribe

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LECYTHIDACEÆ.

THE LECYTHIS TRIBE.

Large trees, with alternate leaves, either entire or toothed at the edges, without pellucid dots, having minute stipules, which soon fall off. The flowers are solitary, or grow on the ends of the leaf-branches, or on separate branches. The calyx is from two to six-leaved, or united in a tube below, having a divided limb; it is either valvate or imbricated in the bud state. The corolla has six petals, sometimes cohering at the base, imbricated in the bud. The stamens are of indefinite number, placed upon a disk which surmounts the ovary; a portion of the filaments is united into a tough substance, which is prolonged into a hooded petal-like body, bending over and concealing the pistil and surrounding stamens; the inner surface is sometimes lined with filaments without anthers. The ovary is below the disk, from two to six-celled; the ovules are few or many, attached to the central axis; the stigma is simple. The seed-vessel is a woody capsule, of a round or long shape, either opening spontaneously with a lid when the seeds are ripe, or remaining closed. The seeds are covered by a thick integument without albumen.

These trees have affinity with the Myrtle tribe, but the alternate and often notched leaves without pellucid dots distinguish them clearly.

The very remarkable hooded plate of additional stamens is the striking character of this tribe.

Lecythis was so named from the Greek *Lekythos*, an oil-jar, owing to the resemblance of the form of the seed-vessel. The lid separates at the upper ridge of the vase where the petals were attached; the lower ridge is the circle of the sepals of the calyx. There is considerable strength and toughness through every part of these trees, the midrib of the leaf is composed of very strong fibres, the flowers are placed on thick woody stalks which enlarge at the top, the seed-vessels are of such solid woody substance that they serve as drinking vessels to the natives. Lecythis *grandiflora* (1) is a noble tree in the ancient forests of Brazil; the flowers are the finest in size and colour of the whole genus; the large seeds are of pleasant flavour, and much esteemed; they yield also a milky juice, which is considered a remedy

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1. Lecythis *grandiflora, Large-flowered Lecythis.* Brazil.
   1A *Ovary.* 1B *Stamen.*
   1C *Filament of the Hood.*
2. *Seed-vessel of* Lecythis *Ollaria.* Guiana and Brazil.
   2A *Seed.*
3. Bertholletia *excelsa, Brazil-nut Tree.*
   3A *Seed.* 3B *Kernel.* Brazil.
4A. Lecythis *ovata. Section of the Flower.* Guiana.
   4B. *Section of the Ovary.*
5A Couratari *Guianensis. Cross section of the Ovary.*

for coughs. L. *Olliaria* (2) is an extremely majestic tree, growing to the height of a hundred feet, spreading into an enormous vaulted crown; in spring, when the young leaves come forth of a red hue, it has a singularly beautiful appearance; the blossoms of this species are white. The large seed-vessels have been long known in this country, being of a nature to bear transport safely; the almond-shaped seeds are, like those of nearly all the tribe, eatable, either in a raw or cooked state; by some persons they are preferred to the European almond, but in general they leave a disagreeable bitter taste in the mouth, peculiar to many tropical fruits. Monkeys and birds make their favourite repasts on them. The bark of L. *Olliaria* is composed of more than a hundred fine layers, resembling thin, smooth paper; the Indians find it very useful for wrapping tobacco for their cigars. L. *amara* bears a seed-vessel three inches in diameter, called by the colonists *petite marmite de singe*. L. *parviflora* and L. *bracteata* are species which abound in Brazil and Guiana. The Portuguese in Brazil are very ingenious in making boxes of the great capsules.

Bertholletia was so named after Berthollet, a celebrated chemist and botanist. B. *excelsa* (3) is a lofty tree, of the greatest longevity in Guiana, being known to live a thousand years. The seeds are contained in a large round woody capsule, and are well known in England as Brazil nuts.

The fruit of Couroupita *Guianensis*, the *abricot sauvage* of Cayenne, and the cannon-ball tree of English colonists, has a pleasant flavour of wine when fresh, but whilst decaying, acquires a most disagreeable odour. The petals, if torn and exposed to the air, become blue at the edges. The shell of the fruit is employed for domestic uses like the calabash. Couratari *Guianensis* is a tree sixty feet in height, the wood is white in the outer circumference, red in the centre; the native Indians make a strong cord of the bark, with which they encircle the stem of the Palm, and thus, with their feet against the tree, and leaning back on the girdle of rope, are enabled dexterously to climb to the summit to gather the fruit or to extract the toddy. The ovary of this genus is three-celled, and contains many ovules; but when the fruit enlarges and ripens, it becomes one-celled, of a slender shape, four inches or more in length, having a central column, to which the seeds are attached in three rows; the capsule remains closed.

The trees of this Tribe are all natives of the hottest countries of South America, more especially of Guiana and Brazil.

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COMBRETACEÆ.

THE COMBRETUM TRIBE.

Trees and shrubs; the leaves are alternate or opposite, without stipules, entire at the edges; the leafstalk has sometimes two glands at the end. The spikes of flowers grow at the ends of the branches, or proceed from the base of the leafstalks. The calyx is adherent in the lower part, with a four or five lobed limb, which falls off. The petals arise from the orifice of the calyx, and are alternate with its lobes, often wanting, as in Terminalia (2). The stamens grow from the upper part of the calyx, and are twice as many as its segments; very rarely equal to them in number. The filaments are distinct, awl-shaped. The anthers are two-celled, bursting lengthwise, or by recurved valves, as in Gyrocarpus. The ovary is one-celled, with from two to four ovules suspended by cords from the top of the cavity; the style is single, the stigma simple. The fruit is a drupe, a berry, or a nut, one-celled; usually one-seeded, closed, often winged. The seed is pendulous, without albumen.

These plants have considerable affinity with the Myrtle tribe, especially with the Pomegranate.

Astringent properties prevail in the bark and fruit.

Combretum (or Poivrea, as it has lately been called) is a genus of elegant plants, differing entirely from that described by Pliny under the same name. C. *purpureum* (1) is a remarkably graceful species, flowering abundantly in a conservatory; the small bracts soon fall off after the flower expands. C. *grandiflorum* of Sierra Leone bears a short spike of drooping flowers with scarlet petals and a long green calyx; the bracts are larger than those of other species, and stand erect. C. *micropetalum*, with yellow flowers, grows in the primæval forests of Minas Geraes and other provinces of Brazil. A gum resembling gum arabic is yielded from the bark of C. *alternifolium*; this appears to be a solitary instance of useful product in the genus. Terminalia the Myrobalan includes several important and valuable species existing in the tropics of both hemispheres in low, damp localities, rarely in dry situations exposed to wind; they afford timber, bark

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1. Combretum *purpureum*. Madagascar.
   - 1A *Flower.*
   - 1B *Stamen.*
   - 1C *Pistil and Ovary.*
   - 1D *Section of Ovary.*

2. Terminalia *Australis*. Brazil.
   - 2A *Flower, magnified.*
   - 2B *Fruit, magnified.*

3. Terminalia *Catappa*. East Indies.
   - 3A *Stone of Fruit.*
   - 3B *A Valve removed.*
   - 3C *Kernel.*

4A. Terminalia *fagifolia*: Brazil.
   - *Winged Fruit.*
   - 4B *Seed.*

for tanning, food, and medicine. T. *Catappa* (3) is a fine tree with broad leaves; the kernels of the fruit are eaten by the natives, and are said to have the flavour of almonds. T. *fagifolia* is a native of Brazil, growing to the height of thirty feet; the stem has an extremely thick bark, the leaves are in clusters at the ends of the branches, and are densely hairy. The fruit (4) is destitute of a fleshy exterior, and is covered only with a fibrous fungus-like substance; the margin of the wings is clothed with a silky down. The milky juice of T. *Benzoin* is so fragrant when dried as to serve as incense in the churches of Mauritius. T. *argentea* yields a powerful resin. T. *Chebula* has glands on the leafstalk; the astringent fruit is very valuable in dyeing; combined with alum, it produces yellow, or mixed with the ferrugineous mud of the country, it forms a good black. Several species are employed medicinally; the root of T. *latifolia* is esteemed in Jamaica; the bark of T. *alata* is a remedy in fever; the astringent fruit of T. *belerica* is used as a tonic; from the bark exudes a gum which dissolves in water and consumes in flame. The kernels of T. *citrina* are among the native medicines of the Hindoos. Some species of Terminalia as well as of Conocarpus and Pentaptera are of considerable dimensions, and yield excellent timber. The bark of Conocarpus is of use in tanning, in Rio Janeiro. Chuncoa has a leathery fruit, with five membranous wings of unequal size, the two larger semi-orbicular and downy. Laguncularia is a shrub bearing spikes of flowers, the calyx of which is covered with a white down; it is frequent in the marshes near the coast in Rio Janeiro; the fruit was found ripe in the month of April by Von Martius. The fruit of Bucida *Buceras* is the shape of the horn of an ox; the tree abounds in the swamps of Jamaica, and affords timber and bark for tanning. Alangium and a few other genera differ in a few points from the regular type of this Order, the limb of the calyx having from five to ten teeth, the petals usually reflexed, sometimes ten in number, and the seeds containing albumen; the roots of Alangium are aromatic, and the fruit eatable though insipid. Nyssa *capitata* bears a small fruit the size of an olive; the fibres of the wood are much interwoven, which renders it difficult to split.

The chief trees and shrubs of this Tribe belong exclusively to the Tropical regions of Asia, Africa, and America, and do not extend beyond them. Nyssa belongs to the United States of America.

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Loaseæ

The Loasa Tribe

Day & Son Limited

LOASACEÆ.

THE LOASA TRIBE.

HERBACEOUS plants, often climbing, for the most part clothed with stinging or pricking hairs, secreting an acrid juice at their base. The leaves are opposite or alternate, without stipules, usually more or less divided at their edges; the flower-stalks are terminal, or on side branches, or grow from the base of the leaf-stalks, each bearing one flower. The tube of the calyx is adherent to the ovary, four or five-parted at the top, and persistent. The petals are five or ten, in two rows, often scale-like, sometimes twisted in the bud, the inner row, when present, much smaller than the outer. The stamens are numerous, in several rows, arising from within the petals, either distinct or adhering in bundles before each petal, within the hollow part of which they lie when the flower first expands. The filaments are awl-shaped, unequal, the outer ones frequently destitute of anthers. The ovary is one-celled, included in the tube of the calyx. The style is single, stigma one or several, united or free at the top. The fruit is a capsule, succulent or dry, crowned with the persistent calyx, one-celled, three, five, or seven-valved, with projections to which the seeds are attached: the seeds contain fleshy albumen, and are many, as in Loasa, or few, as in Klaprothia and Mentzelia.

The stinging hairs of these plants form a solitary link with the Nettle tribe, although their construction is in some points different: in habit there exists an affinity with the Gourd tribe.

The chief property is an acrid fluid, which is instilled into wounds by the singular mechanism of the stinging hairs.

The different species of Loasa bear bright yellow flowers, of very curious structure, but the extreme pungency of the stings renders them disagreeable plants in a garden or green-house. Loasa *grandiflora* (1) is the most beautiful at present introduced here; the leaves of all are more or less covered with stinging hairs, those of L. *Placei* are extremely beset with them on each surface. L. *volubilis* is a twining species from Chile, not sufficiently hardy to bear the open air of this climate. The Pumaysanca of Brazil is a medicine prepared from L. *punicea*.

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1. Loasa *grandiflora*, *Large-flowered Loasa.* Caraccas.
   - 1A *Hooded Petal and Filaments.*
   - 1B *Section of Seed-vessel.*
   - 1C *Stinging hairs magnified.*

2. Bartonia *aurea*, *Golden-flowered Bartonia.* California.
   - 2A *Seed magnified.*
   - 2B *Section of Seed-vessel.*

3. Microsperma *bartonoides.* Mexico.
   - 3A *Long section of Seed-vessel.*
   - 3B *Cross section.*
   - 3C *Seed magnified.* 3D *Hairs magnified.*

4. *Magnified hairs of* Loasa *nitida.*

The Spaniards in South America call Loasa *ortiga*, from its stinging like the Nettle.

Bartonia, so named after Dr. Barton, a botanist of Philadelphia, was first brought to England, from the shores of the Missouri; the two species from thence bear white flowers, and are sweet-scented, expanding chiefly towards night. Bartonia *aurea* (2) has been since introduced from California, and is now become a hardy annual plant in English gardens, and is much admired for the brilliant golden flowers, although the foliage is rough. B. *albescens* of Chile has small, pale flowers, and a white, shining stem.

Microsperma *bartonoides* (3) bears abundant elegant flowers, of exceedingly pure, pale yellow, the numerous slender stamens giving it a very graceful appearance; after the fall of the petals, the flower-stalks elongate.

Mentzelia, a genus of which the capsules contain only a few seeds, was named after Mentzel, a Prussian botanist and physician to the Elector of Brandenburg; they are curious plants, with yellow flowers, like others of this tribe.

All the plants of this Tribe are natives of the Tropical or Temperate regions of North and South America.

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CUCURBITACEÆ.

THE GOURD TRIBE.

Herbaceous plants, with annual or perennial roots, fibrous or tuberous. The stem is generally brittle or succulent, trailing and climbing by the aid of tendrils. The leaves are usually five-parted, or have five distinct ribs; sometimes they are triple or heart-shaped, rough, with small warts or hairs. The flowers are white, yellow, or red; occasionally small and green. The stamens and pistils are in different flowers; the calyx is five-toothed; the corolla is five-parted; sometimes scarcely distinguishable from the calyx, having well-developed cells, and strongly-marked veins; sometimes fringed at the edges, as in Tricosanthes (5). The stamens are five, either distinct, or in two pairs, with one single, inserted on the corolla, alternate with its divisions: the anthers are two-celled, very long and waving. The style is short, stigmas thick, downy, lobed, or fringed. The fruit is more or less succulent, crowned by the remains of the flower. The seeds are ovate, flat, or rounded, enveloped in a skin, which is either juicy or dry and membranous, often thickened at the margin, as in the vegetable marrow (8); sometimes winged; they contain no albumen.

These plants have affinity with the Loasa and Evening Primrose tribe.

Acrimonious juicy pulp and oily seeds are the chief characteristics of the fruits.

Several specimens of this Tribe abound in the East, and were known to the ancients. Their use may be traced to remote antiquity. Cucurbita *claviformis* is supposed to be the gourd of Jonas. Cucurbita *Lagenaria* (1) has a remarkable fruit, in shape like a bottle, often attaining three or four feet in length, and eighteen inches in circumference; in some countries it is called *Calabash*, after the Portuguese name. It is very common in Egypt and Arabia, and serves many purposes. The pulp is white, and unfit for food; but the shell, when emptied and dried, becomes so hard and tough, that it will contain liquids, for which use it is constantly employed, as well as for dishes. In the East Indies, it is usually planted under Mango trees. The larger gourds are made into travelling trunks, which, according

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1. Cucurbita *Lagenaria, Bottle Gourd.* India.
2. Cucumis *sativa, Cucumber.* India.
3. Momordica *balsamina, Balsam Apple.* India.
4. Momordica *Elaterium, Squirting Cucumber.* South Europe.
   - 4A *Stamens.*
   - 4B *Seed.*
   - 4C *Section of Ovary.*
5. Tricosanthes *anguina, Snake Gourd.* China.
6. Bryonia *dioica, Red-berried Bryony.* Britain.
   - 6A *Seed.*
7. A. Cucumis *Melo, Melon. Stamens.*
   - 7B *Seed.*
8. A. *Seed of Vegetable Marrow.*
9. A. *Pistil of Coccinia indica.*
   - 9B *Stamens.*

to Rumphius, an old Dutch author, are strong and excellent; they would, no doubt, be well adapted for modern railway journeys, if introduced to Europe. C. *Citrullus*, the Water-melon, is one of the most valuable fruits of the East, affording an agreeable, cooling food, the general refreshment of all classes. In the soil deposited by the inundation of the Nile, it is cultivated with great produce. C. *Melo* is known under several varieties of Melon in Europe, but is of very superior quality in the floating islets of the rivers of Cashmere, composed of masses of decayed roots of Water-lilies and other vegetable remains, which accumulate, and form the most fertile Melon gardens in the world, the fruit being of large size and exquisite flavour. C. *Pepo* is the celebrated Pompion or Pumpkin. In favourable situations, the fruit reaches four feet in circumference, and is known to readers of fairy tales as having been transformed into a coach for Cinderella. On the Continent, it forms a constant article of food in soups and stews, and is cheap and wholesome. C. *ovifera* is the useful Vegetable Marrow; a variety of this, the Succade gourd, is also much esteemed. The large rough fruit of C. *Melopepo* is the favourite species in North America. The fleshy pulp of C. *maxima*, the red gourd, when boiled, resembles the Carrot in appearance and flavour. Cucumis *sativus* (2) is the most important in this country, and has been brought to a great size by skill and cultivation. In all northern lands it is grown, and in Russia forms a daily meal for all classes during the summer months; its value as food consists in being kept from acquiring its natural bitterness. C. *anguina* is eatable when young, the bitter juices being extracted by boiling; it is three or four feet long, and of a red colour when ripe, curling about stems like a snake. Momordica *balsamina* (3) is said to impart healing qualities to oil, and is thus used for wounds in India. The fruit of M. *operculata* open with a lid, after the manner of Lecythis, which forms a connecting link with the Myrtle tribe. M. *Elaterium* (4) was known to Pliny, having attracted the notice of the ancients for its singular power of expelling the seeds from the fruit as soon as it becomes ripe. The cause of this was discovered by Dutrochet to be the expansion of the fluid within; when that occurs, the force is so great as to break away the fruit from the stalk, and to shoot forth the seeds like shot from an air-gun. The juice was used as a medicine in ancient times, and a poisonous drug is still prepared from it. The fruit of Tricosanthes (5) is remarkable for its extreme length and snake-like form: in a conservatory at Syon, it has been seen upwards of six feet long. Here it is not used, but in India the natives make it one of the various materials for curries. Bryonia (6) is very ornamental in our hedges, when the berries are red in autumn; goats are said to be the only animals that feed on it. Coccinia *indica* (9) is very common in Indian hedges, furnishing favourite food to small birds, and a curry to the natives. Sicyos is the single-seeded Cucumber of North America; a trailing plant with small fruit. Zanonia *indica*, the Bandolier fruit, has the taste and smell of a cucumber. In America, the oil from the seeds of Feuillæa is burnt in lamps. The large oily seeds of Telfairia *pedata* are eaten by Negroes in Africa. The seeds of several species are used medicinally in Brazil.

This Tribe inhabits hot countries in both hemispheres, chiefly within the Tropics; a few species belong to Europe and North America, and several are natives of the Cape of Good Hope; the greatest number are found in India; many occur in Brazil and Peru; some are already known in Australia—one in Norfolk Island. Bryonia is the only British example.

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ONAGRACEÆ.

THE EVENING PRIMROSE TRIBE.

Shrubs and herbaceous plants, the leaves are alternate or opposite, simple, entire or toothed at the edge. The flowers are either on terminal or side branches, of various forms and colours; the calyx is above the ovary, tubular, the upper part divided into four segments, or two, as in Circea (5), closed in a valvular form in the bud, cohering to the points, clinging together in two pair after the flower is expanded. The petals are generally equal in number to the lobes of the calyx, into the throat of which they are inserted, of a regular shape, twisted in the bud; in Skinnera the petals are wanting. The stamens are four or eight, in Circæa two, in Lopezia (6) one stamen only is perfect with an anther, the other is in the form of a spoon-shaped petal. The style is long and slender, the stigma either four-lobed or round-topped. The fruit is a capsule or a berry, with four or two cells, containing numerous seeds without albumen, sometimes bearded; Circæa has only one seed in each cell.

The succulent fruit of Fuchsia connects these plants with the Myrtle tribe, but the want of pellucid dots and their definite stamens clearly distinguish them.

Slight mucilaginous properties prevail throughout the Tribe, and some species are astringent.

Œnothera opens its flowers only towards sunset, and has therefore been called the Evening Primrose, and given the name to the whole tribe; Onagra is a synonym of French botanists. O. *biennis* (1) grows on the sandy coast of Lancashire, where it is supposed to have been originally transported across the Atlantic; it is also found in Suffolk, and on the banks of the Arrow, in Warwickshire. The stem grows to two or three feet in height, often branched and leafy, rough, with very minute tubercles, and sometimes hairy; it is commonly cultivated in gardens, the beautiful though short-lived yellow flowers continuing to come forth in succession every evening during the summer, and being delicately fragrant. The method of expansion of the petals is extremely curious. The calyx parting at the sides,

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1. Œnothera *biennis*, *Evening Primrose.*
   1A *Capsule.* 1B *Seed.* England.
2. Œnothera *macrocarpa*, *Large-fruited Œnothera.* Missouri.
   2A *Pistil and Stamens.*
   2B *Section of Ovary.*
3. Epilobium *angustifolium*, *Rose-bay, or Willow-herb.* England.
   3A *Capsule.*
   3B *Feathered Seed.*
4. Fuchsia *coccinea*, *Scarlet Fuchsia.* Chile.
   4A *Flower opened.*
   4B *Berry.* 4C *Section.*
5. Circea *lutetiana*, *Enchanter's Nightshade.*
   5A *Section of Seed-vessel.* England.
6. Lopezia *coronata.*

shows them twisted within; when they have acquired sufficient vigour to force asunder the points of the calyx hooked together, it falls downwards in two pairs, and the petals gradually expand and spread out flat; in the course of the next morning they wither. The tapering root serves as food to the peasants in some poor countries. This is the only British species, but many others are natives of America and the Cape of Good Hope. O. *macrocarpa* (2) has large and brilliant flowers, and a remarkable seed-vessel, with four wide wings at the angles; the stems are recumbent, and will cover a large space of ground; in the extreme length of the slender pistil we are reminded of some of the Cactus flowers. Epilobium is a genus common in England, adorning our meadows and river banks in various parts, existing here in its greatest perfection; one species alone is a native of the Andes, of no beauty of growth or colour. E. *villosum* belongs to the Cape, and E. *coloratum* to North America. E. *angustifolium* (3) is our most elegant species, found frequently in the north of England and south of Scotland, as well as in other localities near the Thames and elsewhere. It is generally to be seen in gardens near London, where it flourishes extremely well. E. *alpinum* grows on Ben Lomond and other Scotch mountains, as well as E. *alsinfolium*, which forms extensive tufts with its creeping roots. To the genus Fuchsia, named after a famous German botanist, Fuchs, we are highly indebted for the ornament of gardens of all classes; the humblest cottage in the remotest village may possess plants of the once rare but now abundant Fuchsia *coccinea* (4) flowering abundantly throughout the summer. It was first brought from Chile in 1788; since that time several other species have been discovered, and varieties raised. The wooded ravines and moist banks of rivers amongst the Andes are the chief situations where they flourish, being suited to those shady damp regions, whilst the Cactus plants abound in the dry districts of the Cordillera. On the wooded slopes of the Pichincha, at 13,000 feet elevation, where the air is usually filled with mist, Fuchsia *triphylla* displays its numerous large scarlet flowers of remarkable brilliancy. The berry of some species attains a moderate size, and is eatable; that of F. *fulgens*, ftom Mexico, has rather a pleasant sub-acid flavour when made into tarts. Clarkia *pulchella* is a favourite in gardens, introduced of late years from North America. Isnardia is a small plant growing in marshes from Holstein to Geneva. Jussiæa is scarcely worthy of recording the name of three celebrated brothers who rendered essential service to botany; some species belong to South America; one appears with its yellow flowers in the rice-fields of the Khasya mountains of India, at an elevation of 2800 feet. Circæa is said to have been named by the Greeks after the enchantress Circe; it grows usually in moist shady places, and the different species have minute delicate flowers. C. *lutetiana* (5) has been found also in Nepal.

This Tribe inhabits chiefly the Temperate parts of the world, especially of America; a large number of species belong to Europe, some to India; in Africa, they are less abundant, being nearly confined to the Cape, except Jussiæa, which inhabits other parts of that continent.

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The Fig-Marigold Tribe

Dean & Son, Limited

MESEMBRYACEÆ.

THE FIG-MARIGOLD TRIBE.

Shrubs and herbaceous succulent plants, with leaves opposite or alternate, simple, fleshy, often of grotesque forms, sometimes covered with watery protuberances, without stipules. The flowers are complete with stamens and pistil, almost always on terminal branches, sometimes from the base of the leaf-stalk; they are chiefly of brilliant colour, generally opening only in sunshine, and closing in its absence. Tetragonia and a few other genera have small flowers, sometimes wanting in petals. The sepals of the calyx are usually five, more or less combined at the base, either cohering to the ovary or distinct from it, equal or unequal; the petals are slender, numerous, in many rows; the stamens arise from the calyx, and are of indefinite or definite number; the anthers are oblong. The ovary is partly below the calyx, one or many-celled; the styles are of the number of the cells, the stigmas numerous, distinct; the ovules are attached by cords to a central plate, which is either wholly free or united to the edges of the carpels, or spread over the cavity of each cell. The capsule is surrounded by the fleshy calyx, opening in a stellate manner at the top, or when free from the calyx, splitting at the base, or a tough-shelled nut not gaping when ripe. The seeds are attached to the inner angle of the cells, and contain merely albumen.

This order has affinity with Portulaceæ. Tetragonia connects it with Chenopodeaceæ.

Slightly saline properties render these plants in some instances wholesome food; the ashes afford alkali.

The species of Mesembryanthemum, or mid-day flowers, are of exceeding brightness and beauty; they continue to expand every morning for many weeks, and display their petals in the sunshine, of every tint of red, and yellow, and white. The succulent leaves assume a great variety of form; the fruit having sometimes

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1. Mesembryanthemum *minutum, Tiny Fig-Marigold.* Cape of Good Hope.
2. Mesembryanthemum *depressum, Depressed-leaved Fig-Marigold.* Cape of Good Hope.
3. Mesembryanthemum *micans, Shining Fig-Marigold.* Cape of Good Hope.
   3A *Section of Flower.* 3B *Pistils.*
4. Mesembryanthemum *spectabile, Showy Fig-Marigold.* Cape of Good Hope.
5. Tetragonia *expansa, New Zealand Spinage.* New Zealand.
6. Lewisia *rediviva.* North America.
   6A *Stamen.* 6B *Pistil.*
   6C *Capsule split.*
   6D *Section.*
   6E *Seed, magnified.*
7A. *Capsule of* Mesembryanthemum.
   7B *Section of Capsule.*
   7C *Section of Seed.*

the shape of a fig has given the name of Fig-Marigold to the tribe. Mesembryanthemum *edule* affords food to the Hottentots in its fleshy fruit and leaves, whence it has been called Hottentot's fig. These plants belong essentially to the Cape of Good Hope, a very few being scattered in Australia, New Zealand, and elsewhere. M. *nodiflorum* belongs to Egypt, where it is burnt for the sake of the excellent potash it produces. The best known of the species formerly, is M. *crystallinum*, the Ice-plant, introduced from Greece early in this century; the flowers are small and white, the leaves and stalks entirely covered with warts, containing a clear insipid liquid, having the appearance of bits of ice; in this country it is esteemed only as curious and ornamental; in Greece and in the Canaries it is eaten, and large quantities of the ashes are sent to Spain as Barilla. M. *minutum* (1) is remarkable for its singular globular leaves, resembling the form of some of the fungus tribe. M. *depressum* (2) and M. *micans* (3), besides several other species, are generally cultivated in conservatories. M. *spectabile* (4) is one of the most showy, and is of extreme brilliancy in the sunshine. M. *umbellatum* is one of the largest species known, having a stout stem three feet high, bearing sweet-scented white flowers at the top. M. *emarcidum*, when bruised and fermented, acquires a narcotic property, and is used as tobacco by the Hottentots. M. *æquilaterale* affords an eatable fruit to the natives of Australia; it is above an inch in length; the pulp has a mixed flavour of sweet and saline. Tetragonia was named from the four-angled horny fruit; it partakes of the nature and habit of Chenopodeaceæ, and, like some of those plants, furnishes wholesome food. T. *expansa* (5) was found by Captain Cook in New Zealand, and used as an excellent vegetable. In Brazil it grows abundantly on the shores of the Rio Grande, and is very generally eaten by the Brazilians; on the continent of Europe it is now commonly preferred to any other kind of spinage, as it affords a constant supply of its succulent leaves throughout the summer. Lewisia (6), so called after Captain Lewis, who discovered it on the Rocky Mountains of North America, and introduced it to British gardens, where it is occasionally to be seen; the petals are sometimes very pale or white. Aizoon derives its name from the Greek, *always alive;* the plants have a strong power of growth, and vegetate very readily. A. *canariense* and A. *hispanicum*, contain an abundant supply of soda. Sesuvium has no particular beauty; the species inhabit chiefly the West Indies and South America, and bear much resemblance to Purslane. S. *portulacastrum* is called in the East, Pepper Myrobalans, and is used as food either with milk, butter, or rice; it is also thought to have medicinal properties.

The principal portion of this Tribe inhabit the hot sandy plains of the Cape of Good Hope; a few species only exist in North Africa, in the countries of Europe bordering the Mediterranean, in China, in Chili, Peru, and the South Sea Isles.

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The Purslane Tribe

Day & Son Limited

PORTULACEÆ.

THE PURSLANE TRIBE.

Shrubs or herbs of a succulent, fleshy nature, the leaves of which are alternate, seldom opposite, entire at the edges, without stipules, often having tufts of hairs at their base. The flowers are either terminal, or grow from the base of the leaves, generally expanding in sunshine, and of short duration. The calyx is composed of two sepals, united at their base; the petals are generally five, either distinct, or cohering in a short tube; the stamens are inserted with the petals irregularly into the base of the calyx, or attached to the base of the ovary; they vary in number, all contain pollen, the filaments are distinct, the anthers have two cells opening lengthwise. The ovary is composed of three carpels, forming one cell, either free or partially adherent; the style is single or absent; the stigmas are several, much divided; the capsule is one-celled, opening either transversely, or by valves, occasionally one-seeded and closed. The seeds are numerous if the fruit opens, attached to a central plate, with farinaceous albumen.

This Order has most affinity with Mesembryacæ in appearance and habit.

Insipidity of taste and want of smell are the general characteristics of these harmless plants.

Portulaca was known to the ancient Greeks, and valued by them for its cooling and wholesome qualities. P. *oleracea* is a native of the southern countries of Europe, where it is still cultivated, and employed for salads and other culinary purposes; it is but little used now in England, and, according to an old author, was never in great estimation, "for being of a very cold nature, it is unfit to be eaten except in the heat of summer." P. *sativa* is a nearly similar species, introduced from South America; both are extremely succulent in the leaves and stalks; the flowers are small and yellow, placed in the midst of a tuft of leaves. P. *Gilliesii* (1) was brought to England from Mendoza in 1827, and is one of the bright-coloured flowers of the tribe. P. *hirsutissima* (2) is an exception to the usual smooth character of these plants, being clothed with long yellowish hairs; it is a native of meadows in the province of Minas Novas, in Brazil. P. *grandiflora*

1. Portulaca *Gilliesii*, *Gillies's Portulaca.* Mendoza.
   1A *Seed-vessel.*
   1B *Section.*
2. Portulaca *hirsutissima*, *Hairy Portulaca.* Brazil.
3. Claytonia *perfoliata*, *Small-flowered Claytonia.* North America.
4. Montia *fontana*. *Blinks.* England.
   4A *Flower.* 4B *Calyx.*
5. Calandrinia *grandiflora*, *Great-flowered Calandrinia.* Chile.

adorns the sandy valleys of the province of San Paulo with its brilliant purple flowers. P. *paniculata* grows on the maritime rocks of St. Domingo and Martinique, and is thought to possess medicinal properties.

Claytonia *perfoliata* (3) is a hardy little plant, spreading widely in a garden where it is once cultivated, flourishing in a poor soil, and appearing early in spring. In some places it is boiled and eaten like spinage. C. *tuberosa* affords food in its tuberous roots to the poor peasants of Siberia. C. *virginica* is a pretty little species, occasionally seen in flower-gardens, the petals delicately streaked with red, withering before they fall off.

Montia was so named after a professor of botany, at Bologna, in the beginning of the last century; the species are all small, inconspicuous plants. M. *fontana* (4) is the only British species, growing usually in a gravelly soil by the side of streamlets; it seldom rises above three inches in height, but is much branched and spreading: of the succulent nature of this tribe it partakes only slightly: the seed-vessel is of one cell, with three valves folded in at the margins, and not opening transversely, as in Portulaca. This little plant forms part of the scanty flora of Iceland. M. *rivularis* is a native of Germany and of Labrador, generally found on the banks of streams. Calandrinia was so called after a Genoese botanist; C. *grandiflora* (5), and other species, belong to South America: all have beautiful flowers, very ornamental, though of short duration, flourishing best in hot dry situations. C. *arenaria* expands its bright rose-coloured blossoms on the sandy plains of Valparaiso. Talinum is a genus of the same succulent nature and appearance. T. *patens* is used as an esculent herb by the Brazilians, in the same manner as Purslane.

South America and South Africa are the chief countries of this Tribe; a very few have at present been discovered in New Holland; one species belongs to Guinea; Montia is the only British species.

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Lagy & Son, Lorraine

CACTACEÆ.

THE CACTUS TRIBE.

Succulent shrubs, very different in form. The stems are usually angular, or two-edged, or leafy; the wood is arranged either in a ring of wedges, separated by pith, or it consists of fibres loosely interlacing, only forming into compact zones when old. Leaves are almost always absent; if present, they are smooth, fleshy, entire; they most frequently exist only in the undeveloped form of spines. The flowers are of very short duration, the sepals numerous, gradually transformed into petals, either crowning or covering the ovary; the petals are usually numerous, rising in two series from the orifice of the calyx. The stamens are of indefinite numbers, more or less cohering with the petals and sepals; the filaments are long and thread-like. The ovary is below, fleshy, one-celled, containing numerous ovules arranged on projections from the outer portion, equal in number to the lobes of the stigma; the style is long and slender, the stigmas many, collected into a cluster. The fruit is succulent, one-celled, many-seeded, either smooth, or covered with scales, scars, or tubercles. The seeds have no albumen; when ripening, they become detached and embedded in pulp, which is invariably wholesome.

These plants have but little affinity with any others; they approach some Euphorbiaceæ in appearance, but are distinguished from them by their stellate instead of single spines, and by their vessels not giving out their fluid when cut.

The extreme distension of the cellular tissue is the striking character of the Tribe. It contains a vast store of moisture, which is not lost by evaporation, the cuticle being very thick, and destitute of perfect pores. Opuntia contains in its cells flat and star-like crystals. The hairs are difficult of extraction if they enter the flesh, being barbed downwards.

The Cactus, or Nopal Plants, were until lately scarcely seen in Europe; Linnæus knew but few of them. They are so abundant in America as to furnish a national emblem, one of the Mexican banners being an eagle on a Nopal plant. They exist in great variety of curious forms: some species are not larger than a walnut, others are many feet in circumference. Echinocactus *visnaga* is of

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1. Cereus *speciosissimus, Beautiful Cactus.* South America.
2. Echinocactus *Eyriesii, Sea-urchin Cactus.* Mexico.
3. Opuntia *tuna, Indian Fig.* South America.
4. Pilocereus *senilis, Old Man Cactus.* South America.
5. Cereus *flagelliformis, Creeping Cereus.* South America.
6. Rhipsalis *pendula, Drooping Rhipsalis.* West Indies.

7A. *Section of Fruit of* Opuntia *Dillenii.*
7B *Section of Seed.*

enormous round shape. One plant brought in a cart drawn by several oxen, from the interior of Mexico, weighed upwards of 7001bs., and was beset with 8500 spines. In the parched soil, amid the ruins of the Azteck cities on the plains of Mexico, Pilocereus *senilis* rises in angular columns twenty or thirty feet in height, clothed with long grey hairs or spines, bearing no leaves, resembling the forms of architecture rather than those of the vegetable creation; long creeping stems of Cereus *nycticallus* wind amongst the stones. The round spiny Melon-cactus abounds in the hollows of rocks on the glowing pampas of Venezuela. Mammillaria and others ascend the lofty ranges of the Andes. A fleshy-leaved Pereskia, with its dark red-brown flowers, adorns the shores of Lake Titicaca, 12,700 feet above the sea. Vast patches of woolly Echinocactus, looking like sheep at a distance, inhabit the table-lands of Peru, at an elevation of 14,000 feet, on the verge of vegetable life. The larger species have solid wood in the interior; the door-posts of the loftiest habitation in the world, 12,600 feet high, at Antisana, on the Cordilleras, are made of columns of Cereus. Cereus *speciosissimus* (1) is one of the most beautiful species, the flowers in the full light of the sun having a peculiarly brilliant appearance; the stamens and pistil are of very delicate construction, the minute grains of the pollen of the anthers descend the tube of the style a distance 1100 times greater than their own diameter, shooting out a thread slenderer than the finest cobweb, reaching the 30,000 ovules which line the ovary, and enabling them to become seeds. C. *grandiflorus* expands its large white and yellow flowers only in the evening; they are of extreme beauty and fragrance. Opuntia was early carried to Greece, and received its name from a tribe of the people; *tuna* is Arabic for fig, which the fruit resembles in shape. Opuntia *tuna* (3) is planted for hedges in Spain, and in crevices of lava round the base of Ætna; the roots, in growing, cause the lava to crack, and thus the barren ground is brought to fertility. The Sicilians esteem the fruit for its refreshing quality. In the West Indies and in Mexico, it is cultivated for the sake of the red dye obtained in a singular manner by the cochineal insect feeding on it; when the fruit is ripe it bursts open, and is found to be full of these little insects, which are then exposed to the sun to dry. O. *cochinellifera* yields a superior crimson, and is extensively grown in Brazil. It has been lately ascertained that the red colour can be extracted from the fruit, without the intervention of the little *Coccus cacti*. Rhipsalis *pendula* (6) is a remarkable plant, with flexible, leafless branches, bearing very delicate flowers and fruits at the joints. Epiphyllum has a combination of flat leaf and stalk, at the edge of which the flowers grow. Pereskia has flat, fleshy oval leaves, with spines at their base, the leafy sepals remain on the globose fruit. P. *aculeata*, the Barbadoes *gooseberry*, bears numerous green and white flowers; the colourless pulp of the fruit has an agreeable flavour. When transplanted to Temperate climates, the fruit of this tribe is insipid, but in the tropics it is of considerable value to men and animals; some fleshy species are eaten by cattle in Mexico, others afford the principal food of tortoises in the Gallapagos Isles.

America is the native region of this tribe, two species only being found in the East Indies. The chief station must be considered to be the torrid and subtropical zones of America, between 40° of lat. north and south of the equator. The Columbia River is the northern limit on the western coast of North America.

OF THE

GROSSULARIACEÆ.

THE CURRANT AND GOOSEBERRY TRIBE.

Shrubs, some of which are prickly; the leaves are alternate, lobed, plaited in the bud, often having a membranous fringed edge at the base of the leaf-stalks. The flowers grow in bunches, proceeding from the base of the leaf-stalks with bracts at the base; each flower-stalk has also a small bract. In some instances the flowers have an imperfect set of stamens and pistils: the calyx is above the ovary, four or five-lobed, often coloured, imbricated or somewhat valvate in the bud, remaining on the fruit. The petals are four, or five, or wanting, minute, inserted on the throat of the calyx between the lobes. The stamens are four, or five, very short, placed between the petals; the anthers are small, two-celled, and in general burst internally and lengthwise by clefts. The ovary is one-celled, with two plates projecting from the edge; on these numerous ovules are placed on short stalks. The style is two, three, or four-cleft; the fruit is a berry crowned with the withered flower, one-celled, filled with pulp, in which the seeds are suspended by long threads. The seeds have a gelatinous covering adhering closely to the albumen, which is horny.

These shrubs have affinity with the Cactus tribe in the structure of the fruit; they have also some points of resemblance to the Saxifrage tribe.

Malic acid exists in a very large proportion of these fruits, but, blended with saccharine matter in the currant and gooseberry, produces refreshing and cooling properties; vegetable jelly abounds in the fruit.

Ribes is a genus of hardy shrubs, yielding useful fruit abundantly in the temperate climate of Britain; our native species have been much improved by cultivation, and are brought to the greatest perfection in this country, succeeding less well in the more northern or southern states of Europe; in the latter they are superseded by more luscious fruits. R. *Grossularia* (1) is found in woods and hedges in some parts of Yorkshire and the south of Scotland; the branches are smooth between the leaves, but beneath each leaf-bud there are three strong prickles. The fruit is

1. Ribes *Grossularia, Common Gooseberry.*
   - 1A *Flower, open.* Britain.
   - 1B *Stamen.* 1C *Ovary.*
   - 1D *Section of Fruit.*
2. Ribes *rubrum, Red Currant.* Britain.
   - 2A *Section of Ovary.*
   - 2B *Seed, magnified.*
   - 2C *Section, m.*
3. Ribes *nigrum, Black Currant.* Britain.
4. Ribes *aureum, Yellow-flowered Ribes.* Missouri.
5. Ribes *sanguineum, Red-flowered Currant.* N. America.
   - 5A *Section of Flower.*
6. Ribes *speciosum. Showy-flowered Ribes.* California.

of two kinds—smooth and rough,—of various colours when cultivated; in the wild state it is yellowish green. Gooseberries are employed for many culinary purposes in an unripe state, being sufficiently palatable before the whole chemical process of perfecting the saccharine juice is completed; an excellent wine is made of them, rivalling the famed champagne of France; vinegar is also obtained from the juice, and a well-flavoured spirit may be distilled from the skins. R. *rubrum* (2) is occasionally met with in mountain woods, on the banks of rivers, in the north of England and south of Scotland; it grows also in the north of Germany, on the Jura and Lower Alps. The leaves have long stalks, and are fringed at the base; the fruit is in drooping clusters, always smooth, red when ripe, extremely grateful and wholesome, and can be preserved with sugar for winter use. R. *nigrum* (3) grows in several counties of England in moist shady places; it is distinguished from other species by the aromatic glands of the leaves, flower, and fruit, and by the solitary berry on a separate stalk at the base of the cluster; the petals change occasionally into stamens. The fruit has a peculiar subacid property, which renders it valuable as a remedy in sore throats; in Siberia, wine is made from it, and a kind of tea is made with the leaves. R. *sanguineum* (5) was discovered, in 1787, in Nootka Sound, by Archibald Menzies, and afterwards found by him on his voyage with Vancouver, in 1792, on several parts of the mountain tracts of the north-west coast of North America, between lat. 38° and 52°. The natural situations appear to be confined to rocky places within the influence of the sea-breeze; sometimes it grows in shady parts of a shingly shore. It has of late years become acclimatized in our gardens; at first one or two berries only ripened on a cluster, now several come to perfection, although they are of a slenderer, more oval shape than they were described to be by the first discoverers. R. *divaricatum* bears a pleasant fruit as large as a gooseberry, in the vicinity of Indian villages on the coast. R. *setosum* is a very bristly species on the Missouri river. R. *aureum* (4) is smooth, with a tubular and coloured calyx. R. *punctatum* grows near Valparaiso in Chili. R. *speciosum* (6) is remarkable for the highly developed calyx. The elevated range of the Himalaya affords favourable localities for these shrubs; R. *glacialis*, nearly allied to our R. *petræum*, has been found on Gossainthan, Choor, and Manma, at elevations of 8000 and 10,000 feet: R. *acuminatum* is also seen there, as well as eastwards in Nepal; the red and black currants were found amongst the highest shrubs on the Choor mountain, at 11,800 feet. R. *Himalensis* flourishes near the almost inaccessible sources of the Ganges; these Asiatic species secrete acid and jelly, but less saccharine matter than those of European growth. Polyosma is a genus closely allied to Ribes, belonging to the South Sea Islands, having an enlarged calyx and extremely fragrant flowers.

This Tribe inhabits the woods and mountains of the Temperate countries of Europe, Asia, and America; the greatest number of species exist in North America. In the Tropics of Asia and in the South Sea Isles the Tribe is represented by Polyosma.

The Houseleek Tribe

Day & Son, Lithrs.

CRASSULACEÆ.

THE HOUSELEEK TRIBE.

Succulent herbs and shrubs; the leaves are entire or pinnatifid, having no stipules; the flowers are usually collected on the top of the stem, sometimes on branching flower-stalks, on which they occasionally grow on one side only. The sepals of the calyx vary from three to twenty, and are more or less united at their base; the petals are inserted into the calyx, and are either distinct or united into one petal at the base; the stamens are inserted with the petals, and are equal to them in number, and alternate with them, or twice as many, those opposite the petals being usually shorter and later in arriving at perfection; the filaments are distinct, awl-shaped; the anthers have two cells, bursting lengthwise. The carpels are of the same number as the petals, and are placed opposite to them; one-celled, and tapering into stigmas, sometimes consolidated; sometimes there is a honey-scale at the base of each carpel. The fruit consists of several carpels opening down the seam, or the carpels are collected into one capsule of several cells opening at the back. The seeds are attached to the seam, are variable in number, and contain fleshy albumen.

The succulent nature of this tribe connects it with several others.

Acrid, stimulating, cooling, and astringent properties exist in these plants.

The usual situation of these extremely succulent plants is not in moist rich soil, but, as some of the names import, on rocks, stone walls, sandy shores, and house-tops. They require in many instances very little aid from earth, moisture of atmosphere sufficing to nourish them by means of the countless invisible pores which cover the surface of the leaves. They are frequently found to possess an extraordinary power of vegetating even after being uprooted from their place of growth; Sedum *Telephium*, the finest of the British species in this tribe, will continue to put forth pale shoots even after being laid between paper to dry for the herbarium. Sedum *acre* (3), formerly esteemed in medicine for its acrid qualities, is usually found in a stony locality, or on a wall, adorning it with its tufts of golden flowers. S. *linearifolia* appears on the mossy stems of trees in peculiar parts of the Himalaya during the rainy season: other species are dispersed throughout the whole mountain range. Sempervivum *tectorum* (2) inhabits spots

1. Crassula *coccinea*, *Scarlet Crassula*. Cape of Good Hope.
   1A *Flower, open.* 1B *Carpel.*
   1C *Fringe of Leaf, magnified.*
2. Sempervivum *tectorum*, *Common Houseleek*. England.
   2A *Carpel.*
3. Sedum *acre*, *Biting Stone-crop*. Britain.
   3A *Flower.*
   3B *Section of Seed.*
4. Bryophyllum *calycinum*, *Large-cupped Bryophyllum*. East Indies.

apparently the most incapable of affording nourishment, rocky ground, brick wall, or roof of a house. It is not uncommon in this country, but does not flower so freely here as on the Continent; in rocky caves on the Lake Thun, in Switzerland, it acquires considerable size and beauty in the flowering stem. The leaves were once much valued by the poor for their supposed cooling properties. Sempervivum *glutinosum* is used by the fishermen of Madeira to render their nets tough and durable. The various species of Crassula are remarkable for the fleshy nature of the leaves, fringed with colourless thick hairs; C. *coccinea* (1) and others have brilliant red flowers, which, being of long duration, are great favourites in conservatories. Bryophyllum *calycinum* (4) possesses in a striking degree the power of growth within itself; the large leaves of thick cellular substance, after being gathered from the plant and laid on the ground, will produce young plants from the notched margin. The calyx of this species is of unusual size, and tubular shape. Rhodiola *rosea* is a British species, but rare; the leaves occasionally serve as food to the poor Greenlanders. Kalanchoe *Brasiliensis* is devoid of acridity, and is esteemed by the Brazilians.

The chief mass of the plants of this Tribe is at the Cape of Good Hope, about half the known species being found there: the rest are scattered in scanty numbers over the mountains of India, in China, and Japan; a few extend northwards to Siberia and Greenland; some grow in the Canaries, some in Mexico, and in the United States; a very few in Barbary, several in the Levant, fifty-two in Europe; two have been discovered in New Holland; none in the Mauritius, or in the West Indies.

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Saxifragaceæ.

The Saxifrage Tribe

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SAXIFRAGACEÆ.

THE SAXIFRAGE TRIBE.

HERBACEOUS plants, nearly all of which are perennial, having fibrous or granular roots, often growing in spreading patches; the leaves are either whole at the edges or divided, alternate, with or without stipules. The flower-stems are simple, usually without leaves; the calyx is either above or below the ovary, and has four or five sepals, which are united more or less at their base. The petals are five, or wanting as in Chrysosplenium (6), inserted between the lobes of the calyx, or beneath the ovary. The stamens are either five in number and alternate with the petals, or they are ten, five usually of smaller size and later in arriving at perfection, being opposite the petals; the filaments are awl-shaped, fixed into the calyx, or beneath the ovary; the anthers are two-celled, bursting either by pores or chinks lengthwise. The disk is sometimes obsolete, sometimes annular or notched, rarely composed of five scales. The ovary is composed usually of two carpels, cohering more or less, diverging at the top; sometimes two-celled, with a central column, sometimes one-celled, having a projection on which the seeds are placed, at each seam of the carpels. The styles are in some cases nearly obsolete, the stigmas being on the tips of the carpels. The fruit is a membranous capsule, the cells separating when ripe; the seeds are numerous, very minute, containing fleshy albumen, usually with long hexagonal reticulations on the transparent covering.

These plants have close affinity with the Rose tribe, but are distinguished by the partially united carpels, and the seeds containing albumen.

Slightly astringent properties exist in some of the plants of this tribe.

Saxifraga is an extensive genus, widely dispersed over the temperate or cold regions of the globe, growing chiefly on mountains, and there frequently spreading over the ground to a considerable extent, many of the species having runners from which fresh plants proceed. When it is found in lower situations, it is usually along the rivers which descend from mountains or hills; in the most northern countries it exists on the level plains, finding there a temperature and soil as

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1. Saxifraga *umbrosa*, *London Pride*. England.
   - 1A *Capsule.*
   - 1B *Section magnified.*
   - 1C *Seed, m.*
2. Saxifraga *aizoides*, *Yellow mountain Saxifrage.* England.
   - 2A *Flower.*
   - 2B *Petal, m.*
   - 2C *Pistil.*
   - 2D *Stamen, m.*
   - 2E *Leaf, m.*
3. Heuchera *cylindrica.* North America.
   - 3A *Section of Flower, m.*
   - 3B *Section of Ovary, m.*
4. Tiarella *cordifolia.* North America.
5. A *Section of the Flower of* Saxifraga *tridactylites, m.*
   - 5B *Section of Capsule, m.*
   - 5C *Section of Seed, m.*
6. *Flower of Chrysosplenium, m.*

favourable as on the lofty parts of warmer regions. The Polar region has been denominated that of Saxifrages and Mosses, those plants being the most numerous representatives of the two great classes of the vegetable kingdom, in that portion of the world. Saxifraga *oppositifolia, cernua* and *rivularis* of Britain and Switzerland, grow on the plains of Melville Isle, as well as in Iceland. S. *bryoides, aspera, cæspitosa, sedoides,* and others, are found amongst the small plants which ascend to the region of snow on the Swiss Alps, between 7000 and 9000 feet. S. *imbricata, ramulosa,* and species of similar Alpine character, grow on the Himalayas, above 11,000 feet, in situations where the climate very nearly resembles that of the Polar regions. Some kinds of Saxifrage have been observed at an elevation of 13,000 feet on the Andes. S. *umbrosa* (1) is the most beautiful of our English species, found only rarely in a wild state, but a general favourite in gardens, thriving even in the smoky air of cities, whence the popular name of London Pride: it is, however, of superior brilliancy and beauty when seen in its native place, amidst the rocks of the stream which flows through Heselden Glen, in the Craven district of Yorkshire. S. *aizoides* (2) is very frequent on the margins of mountain rills, or in a peat soil, in Wales, Scotland, and Ireland: several other species abound in mountainous localities. S. *granulata* is remarkable for the large granules of the roots. S. *tridactylites* (5), very common on old walls, wherever there is sufficient moisture, and on untrodden gravel walks, is one of the earliest plants of the year to attract the notice of a botanical student: the whole plant is covered with red glandular hairs, worthy of microscopical examination. On descending the Simplon Pass into the valley of Ossola, one of the most striking objects on the rocks is S. *pyramidalis;* this graceful species is seen also in the far north, on the rocks which bound the Fiords of Norway, in lat. 63°. S. *crassifolia* of Siberia is a well-known plant in spring, adorning gardens with its large oval leaves and fine branches of purple flowers. There is occasionally one plant in a natural order which forms an exception to the general character; in this instance S. *sarmentosa* of China furnishes an example of an irregular flower, two of the petals being much longer than the rest. Heuchera *cylindrica* (3) is one of a few species, all natives of North America; it is destitute of petals, and of less beauty than many of the tribe. Tiarella (4) is said to have been named from the shape of the seed-vessel being like a tiara or mitre; Mitella has the same derivation of name: both belong to North America. Chrysosplenium (6) is scattered over Europe, and forms part of the scanty Flora of Melville Isle, consisting only of thirty species; the flowers are without petals, the calyx having a yellow hue; in the Vosges it is eaten as salad.

This Tribe inhabits the mountainous tracts in Europe, the northern countries of Asia and North America; some species exist on the Andes of South America, and at the Straits of Magellan: none are natives of the Tropics.

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The Clove-Pink Tribe.

CARYOPHYLLACEÆ.

THE CLOVE-PINK TRIBE.

Herbaceous plants, occasionally becoming partly shrubby at the base; the stems are enlarged at the joints. The leaves are always opposite, often united at their base, entire at the edges. The calyx has four or five sepals continuous with the flower-stalk, persistent, distinct, or cohering in a tube. The petals are four or five inserted upon the short stalk of the ovary, frequently deeply cleft, often having scales, which form a crown at the top of the tube: occasionally the petals are wanting, as in Mollugo (10). The stamens are usually twice as many as the petals; the filaments are sometimes united in a set, awl-shaped, the anthers fixed on the point, two-celled, opening longitudinally. The ovary is composed of from two to five carpels, and is placed on a small stalk; the stigmas are from two to five, thread-like, rough on the inner edge, the ovules few or many. The capsule is from two to five-celled, with a central plate either free in the one-celled capsule, or adhering slightly to the edges of the valves in the five-celled capsules. The seeds are indefinite, rarely few, kidney-shaped, having a crustaceous exterior, and mealy albumen within.

These plants have some affinity with the Saxifrage tribe, and resemble the Portulaceæ in many points.

Insipidity is their chief character; a few are saponaceous.

Although it is to this Tribe that we are indebted for the clove-pink with all its varieties of Carnation and Picotee, and other flowers which have long been prized as ornaments of gardens, yet the principal portion of the plants are of small size and insignificant aspect. Dianthus was so named by the Greeks on account of its extreme fragrance and beauty. D. *armeria* (1) is the most common of our pinks, found in various places in England, chiefly on a gravel soil; it is supposed to be the origin of many kinds of garden Pinks, the cultivation of which affords

1. Dianthus *armeria, Deptford Pink.* England.
   1A *Stamens.* 1B *Pistil.*
2. Lychnis *diurna, Red Campion.* England.
   2A *Petal.* 2B *Stamen.*
   2C *Section of Ovary.*
3. Cerastium *arvense, Field Chick-weed.*
   3A *Seed.* England.
4. Arenaria *marina, Sea Sand-wort.* England.
5. Dianthus *caryophyllus, Clove-Pink.*
   England.
6. Lychnis *Bungeana.* Asiatic Russia.
7. Agrostemma *coronaria.* Italy.
8. Silene *acaulis, Moss Campion.* Britain.
9A. Stellaria *media, Common Chickweed.*
   Cluster of Seeds.
   9B *Section of Seed.*
10A. Mollugo *glinoides.* *Flower magnified.*
   10B *Section of Ovary.*
   10C *Seed-vessels.*

peculiar interest to some classes of persons who are deprived of much space of ground; the manufacturers of Paisley and other towns delight in raising the different varieties. D. *caryophyllus* (5) is occasionally seen on old walls, as on those of Norwich, Rochester Castle, and elsewhere. In the wild state, the petals are small and of a pale pink; throughout Europe it is much esteemed for its delicious fragrance, and is a general favourite in the formal flower-beds of the Dutch, and the more luxuriant gardens of the Italians. The leaf has been found to contain on each surface 38,500 pores in a square inch. D. *deltoides* is found in grassy pastures about Blair Athol and other parts of Scotland. D. *cæsius* is the rare Mountain-Pink, confined to the Cheddar cliffs in this country, but dispersed in favourable localities in Switzerland and Germany. D. *barbatus*, the *Sweet William*, is one of the oldest inhabitants of our flower-gardens, brought from the South of Germany. D. *superbus* is an elegant species, having the petals numerously and finely divided, a native of the South of France and the wide valleys of the Pyrenees. Lychnis affords a few bright-coloured flowers from Russia and other countries; several species also adorn our fields and hedges, one of the most abundant is L. *diurna* (2), which continues to blossom late into the autumn. Some kinds of Lychnis and Silene have glutinous hairs, which entangle flies and small insects, whence their common name of Catch-fly. Silene *acaulis* (8) belongs to that portion of the tribe which thrives best in Alpine situations, on the Scotch and Swiss mountains it grows in close tufts, the bright rosy flowers shining amidst the slender leaves. S. *inflata* and S. *viscosa*, of England and Siberia, are found also on the Himalayas. S. *cisplatensis* grows on the sands of the sea-shore near Monte Video, Brazil, the calyx clothed with long hairs. Agrostemma, "the crown of the field," deserves its appellation; our common corn-cockle is hardly surpassed by A. *coronaria* (7) of Italy. Cerastium (3) is common in Europe and other parts of the world, bearing small white, star-shaped flowers. C. *rivulare* is a native of river-shores of Brazil. Arenaria *marina* (4) is frequent on our sandy coasts; the fleshy leaves have membranous stipules sheathing their base. A. *peploides*, of Britain, belongs also to Iceland, and is valued by the poor peasants as wholesome food, after being steeped in sour whey till it ferments. A. *verna* is found also in Madeira. Stellaria *media*, *Chickweed* (9), is well known as the common food of small birds, who find a suitable provision in the mealy albumen of the seeds. This humble little plant is widely scattered over the earth, being very general in Europe, springing up on the plains of India during the cold season, and seen by the wayside near cities in Brazil. Spergula *arvensis* yields nourishing food to sheep. Saponaria *officinalis* contains *Saponine*, as does Gysophila *Struthium*, the Soap-root of Egypt, and a few other species. Mollugo *glinoides* (10) flourishes on the sandy banks of the river Uruguay, in Rio Janeiro.

This Tribe is found in the Temperate and cold regions of the globe, in various localities; in the Tropics, on lofty mountains; on the Alps, ascending to the limits of perpetual snow; on the plains of Lapland, forming a considerable portion of the vegetation. Mollugo is the most tropical genus.

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Umbelliferæ

The Umbel-flowered Tribe

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UMBELLACEÆ.

THE UMBEL-FLOWERED TRIBE.

HERBACEOUS plants, and a few undershrubs, with solid or hollow furrowed knotted stems, containing occasionally a milky juice. The leaves are usually divided, sometimes simple, with parallel veins, the leaf-stalk usually expanded into a wide sheath at the base. The flowers grow in umbels, generally surrounded by an involucre at the base: the calyx is above the ovary, either whole at the edge or having five teeth. The petals are five, inserted on the outer rim of a fleshy nectariferous disk, often bent inwards at the point, the outer petals sometimes the largest (9). The stamens are five, alternate with the petals, curved in whilst in the bud. The ovary is below, crowned by the disk; it contains two cells, with a solitary pendulous ovule in each; the styles are two, distinct, persistent, with simple stigmas. The fruit is composed of two carpels, separable from a slender central axis, sometimes having a long bristly beak (8); each carpel has elevated ridges, between which are linear receptacles of essential oil; the seed usually adheres to the covering, and contains abundant horny albumen.

This order is most nearly allied to Araliaceæ, but is distinguished by the fruit separating into two parts, and by the seed adhering to its covering.

A watery acrid and poisonous liquid, a gum resinous milky juice, of stimulating properties, and an aromatic oil, are secreted by these plants. When the two first exist only in a slight degree, and mucilage and sugar predominate, several species are wholesome as food, and are cultivated in all European countries for the sake of the herbage or the roots. One of the most useful is Daucus *Carota*, frequent on a chalk soil in this country, easily recognised by the one dark flower in the centre of the white umbel; when cultivated, the root becomes enlarged, succulent, and sweet, and is known and esteemed as the Carrot; in some countries a strong spirit is distilled from it. Pastinaca (2) affords also a supply of nutritive food in the large white root. Apium *Petroselinum* is the common Parsley; A. *graveolens*, Celery, loses its acridity, and acquires size and crispness from the

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1. Carum *carui*, *Caraway*. Britain.
   1A *Seed*.
2. Pastinaca *sativa*, *Parsnip*. England.
   2A *Flower*. 2B *Fruit*.
3. Crithmum *maritimum*, *Samphire*. Rocky Sea-shores, England.
4. Hydrocotyle *vulgaris*, *Marsh Penny-wort*. Marshes, England.
5. Leucolena *rotundifolia*. Port Jackson.
6. Astrantia *maxima*. Caucasus.
   6A *Flower*.
7. Prangos *pabularia*, *Hay-plant*. Thibet.
   7A *Section of Seed*.
8A. Scandix *Pecten-Veneris*, *Beaked Fruit*.
9A. Daucus *Carota*. *Flower*.

manner in which it is grown. Crithmum *maritimum* (3), Samphire, found always near the sea, but beyond the reach of the waves, is one of the best plants for pickle. The hollow stalks of Angelica are made into an excellent preserve with sugar; in Iceland, Norway, and Lapland, it forms an article of food to the peasants. Heracleum *spondylium* is not valued in England, but in Kamtschatka and Russia the young shoots are boiled and eaten. The Eryngium of our coasts is a variation from the general aspect of this tribe, being extremely stiff and prickly; when candied, it is of delicious flavour. The roots of Arracacha are a winter food in South America. Of the aromatic kind, the principal is Carum (1), known in the time of Pliny as one of the native plants of Caria; the seeds are used for several purposes, the roots also are eatable. Anethum includes Fennel and Dill; both have finely divided leaves; the latter is cultivated in the south of France for the sake of its medicinal seeds. The root of a variety of Fennel, called *Finochio*, is eaten at Naples. Pimpinella *anisum* yields the anise-seeds, employed to a considerable extent by French doctors and confectioners. The round seeds of Coriandrum have an agreeable aromatic taste, and are much used on the Continent as well as in Peru; the rest of the plant is of disagreeable odour. The chief species, yielding gum-resin from the root or stem, are Opopanax, supposed in the East to be an universal remedy; Galbanum of Ethiopia, and Ferula of Persia and the Levant, affording powerful medicine, and a stimulating condiment, highly relished by the Persians. The Hottentots prepare a strong beverage from the roots of Lichtensteinia. Some, especially of the aquatic species, contain extremely deleterious juices: Conium *maculatum*, Hemlock, is one of the most poisonous, known in remote ages, spoken of by the Jewish prophets, described by Hippocrates, and selected as a certain means of death to Phocion and Socrates. Although a native of England, its injurious qualities are not so fully developed as in warmer parts of Europe. Œnanthe *crocata* and Cicuta *virosa* are both dangerous to men and cattle. Of those yielding fodder, Prangos *pabularia* (7) is supposed to be the most valuable for sheep; from the large fleshy root proceed thick tufts of long and finely cut leaves, abundant and nutritious. Heracleum *giganteum*, of Siberia, is said also to afford excellent provender, in height rivalling Ferula *communis* of South Europe, thought to be the tallest of herbs, recorded by Gerard to have attained fifteen feet in his garden in Holborn; it covers the isles in the Sea of Marmora, and was known and used by the ancient Greeks: in Sicily, the pith is used for tinder. Hydrocotyle (4) varies from the regular form of umbel; it is of interest as a genus widely dispersed over the earth; the leaves of H. *Asiatica* serve to heal slight wounds in India; H. *umbellata* is a native of Brazil; H. *villosa* belongs to the Cape. Leucolena (5) is an elegant exception to the general type of involucre. Bolax *glebaria*, of Chile, grows in close tufts, like some of the Alpine Saxifrages. Bupleurum is a genus with simple leaves; B. *spinosissimum* is seen on the shores of the Mediterranean. The poisonous species grow generally in low, shady, watery places, seldom on mountains; Phellandrium *mutellinum* contributes to the excellent pastures on the Alps, at 5500 feet. Several species, only an inch high, with heath-like leaves and large fruit, grow at the limits of perpetual snow, near Santiago, on the Andes.

In the northern regions of the world, this Tribe inhabits various localities, from the low marsh to the highest hills. It is rare in the Tropics, except on mountains, scarcely seen on the plains of India, abundant on the Himalayas. A few genera are frequent in South America; a very few belong to Africa or Australia.

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Aralia nudicaulis

The Aralia Tribe.

Day & Son, Lithtrs.

ARALIACEÆ.

THE ARALIA TRIBE.

Trees, shrubs, and herbaceous plants; the leaves are alternate, usually divided or compound, sometimes lobed or simple; the leaf-stalks are widened at their base. The flowers grow in umbels at the ends of the branches, usually surrounded by a few small leaflets in an involucre, or from the base of the leaf-stalk. The petals are two, five, or ten, occasionally wanting. The stamens are either equal in number to the petals, or twice as many, growing between the border of the calyx and the disk. The ovary is below the calyx, having more than two cells; the styles are of the same number as the cells, sometimes united together; the stigmas are simple. The fruit is succulent, or dry, consisting of several cells, each with a solitary seed, which contains albumen.

The plants have considerable affinity with Umbellaceæ, but are readily distinguished by the fruit having more than two cells. Hedera forms a link with Viburnum, in the Honeysuckle tribe.

The properties are generally aromatic and stimulant: gum-resin occasionally exists in the root. Aralia was first brought from Virginia in 1688; several species have been since found in North America and in New Zealand. Aralia *polaris* was discovered by Dr. Joseph Hooker, in Lord Auckland's Isles in the Southern Ocean. Some of the species have remarkably neat foliage, the leaves of others resemble those of the common Umbelliferous plants, to which in habit and manner of growth they are so closely allied. A. *hispida* (1) is a low shrub found by Michaux, on steep rocky mountains, between Canada and Hudson's Bay; the lower part of the stem is clothed with rigid hairs; when bruised, the plant is bitter and nauseous, but it yields an aromatic gum-resin from its root, similar to that obtained from A. *racemosa* and A. *spinosa*. The young shoots of A. *nudicaulis* are used medicinally in North America. The petals of A. *palmatum* and a few other species cohere at their points; some of these plants are of a climbing nature; a few are parasitic in their manner of growth.

Panax *quinquefolium*, the famous *Ginseng*, or "wonder of the earth," of China and Tartary, was anciently supposed to contain in its aromatic root a remedy

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1. Aralia *hispida*, *Bristly Aralia*. North America.

2. Panax *pseudo-ginseng*, *Indian Ginseng*. Himalayas.
   2A *Fruit*.
   2B *Cross section*.
   2C *Seed*. 2D *Section*.

3. Hedera *Helix*, *Common Ivy*. Britain.
   3A *Flower*. 3B *Stamen*.
   3C *Pistil and Ovary*.
   3D *Section*. 3E *Cross section*.

4. Adoxa *moschatellina*, *Tuberous Moschatell*. England.
   4A *Flower, magnified*.

for all diseases; in more modern times, the Chinese seem to have used it also as a preservative of health; for Osbeck, the traveller, relates that they take it daily in tea and in soup. Owing to its imagined medicinal value, and the difficulty of obtaining it from the almost inaccessible places where it grows, it has been said to have cost its weight in gold. This extraordinary plant is also a native of North America, and is employed by the Canadians as a cure for asthma. Panax *pseudo-ginseng* (2) resembles it in appearance, but the aromatic properties of the root are inconsiderable, the mucilaginous substance being very nearly scentless. It is found on the mountains of Sheopore, in Nepal, at an elevation of 9000 feet above the plains, in the shade of Oaks and Rhododendrons. Several other species belong to the mountain ranges of India, generally between 2000 and 3000 feet; some grow on wet mossy banks in the valleys at 6000 feet. A few are shrubs with strong spines, others are smooth; the flowers are usually small, pale yellow or white. One species in Bootan is a low tree, having the habit of a Palm, the simple straight stem rising to about twenty feet, the leaf-stalks beset with strong straight spines. P. *quinquefolium* is a native of Pennsylvania, bearing its little umbel of greenish white flowers on a stalk only eight inches high. On the Campos of Brazil, a species of considerable size is frequent. Hedera *Helix* (3) was highly esteemed by the Romans, and adopted as a suitable plant for a poet's crown. The name is supposed to have been derived from the Celtic word *hedra*, cord, which the rough stems wound round other trees exactly resemble. No other plant contributes so much to the ornament of bare walls or old ruins, and the climate of Britain is peculiarly favourable to its luxuriant growth. The flowers appear in October, when they afford acceptable food to bees and flies; the fruit is not mature until the following spring. A variety, called Irish Ivy, although a native of Madeira, grows with great rapidity, and is of more brilliant foliage. In the countries bordering the Mediterranean, a kind of resin exudes from old stems of Ivy, and is used as gum, having an agreeable odour when burned. H. *polycantha* of Nepal is spiny on the stems and branches; the palmate leaves are ten inches long, giving it more the aspect of Panax than of common Ivy. H. *rotundifolia* grows in Japan: H. *ternata*, in Brazil: H. *arborea*, in Jamaica. In Hong Kong are found H. *parviflora* and H. *pro'ra*. Adoxa *moschatellina* (4) is a delicate little plant of a lowly growth, rare in England, but occasionally seen on sheltered banks and in copses, about the end of April, before a thicker vegetation conceals it; the fruit becomes a pulpy berry in ripening.

These plants are dispersed in the Tropics and neighbouring regions, as well as in cold countries: some exist in the United States, in Canada, on the north-west coast of America, and in Japan. Aralia *polaris* is found in Lord Auckland's Isles, in 50° of south latitude.

OF THE

The Honeysuckle Tribe.

Day & Son Limited

CAPRIFOLIACEÆ.

THE HONEYSUCKLE TRIBE.

Shrubs and herbaceous plants, the leaves of which are opposite, entire at the edges or toothed, without stipules. The flowers are of various forms, sometimes having an involucre at the base of the cluster. The calyx is above the ovary, four or five-cleft, usually having two or more bracts at the base; the corolla is composed either of one petal or many, flat or tubular, regular or irregular. The stamens are attached to the petals, equal in number to the lobes of the corolla, and alternate with them. The ovary has from one to five cells, one of which is often one-seeded, the others many-seeded; the single style is crowned by one, or three, or five stigmas. The fruit is dry, fleshy, or succulent, crowned by the persistent lobes of the calyx. The seeds solitary and pendulous, or numerous and attached to the axis, the covering often bony; they contain fleshy albumen.

This order has much affinity with Saxifragaceæ. Sambucus forms a link with Umbellaceæ.

Astringent and tonic properties, and a fragrant scent, exist in these plants.

Caprifolium, from which this tribe is named, is an old favourite with all classes. C. *Periclymenum* (1) is the most fragrant of British flowers, particularly in the evening; flourishing luxuriantly, in many parts of England, in the hedges. At the base of the tube of the flower there is a store of honey, which the Hawk Moth extracts with its long tongue. The strong stems climb over bushes to a considerable height, bearing numerous flowers; the fibrous covering of the stalks is very tough, and has been woven for use. C. *Douglassii* is one of the finest species of North America, having leaves seven inches long. Lonicera is a name given to some of these plants, in memory of a German botanist. L. *japonica* is very elegant, and has been called the "gold and silver flower," from the lower row of flowers becoming yellow as they begin to wither, whilst the upper ones are a pure white; a habit which prevails more or less in all the species. L. *flexuosum*, from China, is delightfully odoriferous, and very general now in gardens. The fruit is generally red when ripe; but that of L. *cærulea*, of Switzerland, is blue; in

1. Caprifolium *Periclymenum*, *Honeysuckle or Woodbine.* England.
2. Viburnum *Opulus*, *Guelder Rose.* England.
   2A *Calyx and Pistil.* 2B *Fruit.*
3. Linnæa *borealis*, *Two-flowered Linnæa.*
   3A *Flower.* 3B *Fruit.* England.
   3C *Section of Seed.*
4. Abelia *floribunda*, *Many-flowered Abelia.* Mexico.
5. Symphoria *racemosa*, *Snow-berry.* Canada.
6. Weigela *rosea.* Northern China.
7. Benthamia *fragifera.* East Indies.
8. Sambucus *nigra*, *Elder.* Mexico.
   Section of Fruit.

Kamtschatka these berries are a favourite food of the natives. Viburnum *Opulus* (2) is very common in hedges. In a wild state the outer flowers of the cluster are imperfect productions, having neither pistil nor stamens, but they are much enlarged in size; those of the interior are small and complete. In the garden variety all the flowers are irregularly developed, and so cause it to be well named the *Snow-ball* tree. The fruit is oval, bright red, very juicy, but bitter and nauseous. V. *Tinus* is the cheerful Laurustinus, one of the hardiest and most ornamental of winter shrubs, introduced long ago from the south of Europe. Sambucus, the Elder, is one of the most useful of small British trees in all its parts, and is remarkable for the hardness of the wood, for which it was esteemed by the Latins for musical instruments; in old trees it is of a yellow colour, and takes a bright polish. The pith of the young shoots is exceedingly light, and serves for several purposes. It is very common in hedges and cottage gardens; the sweet-scented flowers are used in various ways, and the clusters of small black berries (8) are made into excellent wine; in Germany a strong spirit is also distilled from them: both flowers and fruit are poisonous to poultry. S. *Ebulus* is a dwarf kind, more frequent in Germany than England. This genus is widely dispersed, one species belonging to China, others to North America; one has been discovered in Tasmania, with a sweetish, wholesome, white fruit. Linnæa (3) is the humble little plant modestly selected by the great naturalist to record his name. In the fir-forests of northern Europe it is frequently seen trailing over the ground, the slender flower-stalks bearing the delicate blossoms in a very graceful manner; the Swedes consider the leaves to have useful medicinal properties. Abelia (4) is one of the lately imported plants from Mexico, a land contributing much to European gardens. Symphoria (5) is chiefly ornamental in autumn, when the berries are ripe; in their tissue the microscope reveals the existence of spiral vessels. Weigela (6), brought over by Robert Fortune, has added another desirable plant to our collection of this Tribe. Benthamia (7) was found by Dr. Wallich in various parts of the Himalayas, from 6500 to 8000 feet, with Sorbus, Cratægus, and other European shrubs; the cream-coloured involucre resembles that of Cornus *florida*. The fruit consists of many carpels grown together, and is of agreeable flavour; in the genial climate of Cornwall it flourishes in the open air. Leycesteria is from Nepal; the flowers have large purple bracts, which give a singular appearance. Cornus *sanguinea* of our woods makes the best charcoal for gunpowder; the bitter fruit yields oil to the Tyrolese. C. *suecica* grows on the Cheviot Hills, and in Scotland.

These plants are natives of the northern countries of Europe, Asia, and America, a few extending into the Tropics; rare in North Africa, and very seldom seen in the Southern hemisphere.

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LORANTHACEÆ.

THE MISTLETOE TRIBE.

Shrubby plants, almost all of which are true parasites, growing into the tissue of other plants; the leaves are opposite, or sometimes alternate, fleshy, without stipules, generally veinless. The calyx rises from within the brim of the flower-stalk, and is usually surrounded with bracts at the base; the sepals are three, four, or eight, often united in a tube, sometimes enlarged and coloured, having the appearance of petals; true petals are wanting. The stamens are equal in number to the sepals, and opposite to them; in Viscum, they lie upon the inner surface of the sepals; the anthers are one or two-celled, or broken up into numerous cavities. The ovary is one-celled, sunk within the cup-like expansion of the flower-stalk, and adhering to it. The style is single, the stigma simple, sometimes invisible. The fruit is succulent or dry, one-celled; the seed is solitary, with fleshy albumen.

This Order has most affinity with the Sandal-wood tribe, but it differs from it and all others in some peculiar points of structure, and in manner of growth.

The astringent bark and viscid berries insoluble in water or alcohol are the chief properties of these plants; they possess also the singular quality of rooting and vegetating on other plants.

Viscum *album* (3) is remarkable for being the only true parasitical plant of Britain, not commencing its growth in the ground, as the Dodder, nor deriving any direct portion of nourishment from it afterwards, like Orobanche. The seed enveloped in its glutinous substance, falls on some favourable part of a tree, and remains fixed, whilst the roots insinuate themselves between the bark and the wood; as soon as the albumen of the seeds is exhausted, the roots extract nourishment from the wood of the supporting tree. The young wood of Viscum is divided into eight portions around the central pith; outside these are smaller bundles of fibres. Other parasites seem to attach themselves to peculiar plants, but the Mistletoe is found upon various trees besides the traditional Oak; it may be seen on the Maple, Poplar, Lime, Ash, and in Germany sometimes on the Pinus *sylvestris*. The ancient Druids considered it a sacred plant, or at least employed it as a symbol of some religious meaning; perhaps as a sign of abstraction from earth and

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1. Loranthus *Evenius.* Java.
2. Loranthus *formosus.* Java.
3. Viscum *album, Common Mistletoe.* Britain.
   - 3A *Cluster of Fruitful Flowers.*
   - 3B *Single Pistil Flower.*
   - 3C *Stamen Flower.*
   - 3D *Stamen, magnified.*
   - 3E *Seed.*
   - 3F *Section of Fruit.*
   - 3G *Section of Stem.*
4. *Flower of* Loranthus *pentrandrus.*
   - 4A *Flower, open.*
5. *Section of Fruit of* Loranthus *chrysanthus.*

contemplation of heaven, it being the only specimen of the vegetable kingdom with which they could have been acquainted, growing and flourishing without any actual derivation of support from the earth. It was customary with them to carry about branches of it to proclaim the celebration of the new year; useful information in those times, when even such common knowledge was scantily diffused, and welcome tidings to the poor peasant, whose dreary life was in need of the cheering influence of their periodical festivals. The white berries ripen on the branches of the preceding year, and the plant appears in greatest perfection in winter. Loranthus (1) has an enlarged, tubular, and often brightly coloured calyx, having the aspect of a true corolla. The glutinous seed affixes itself to a branch or stem, occasionally to a leaf, stretching out the sucker-like fibres of the root over it in the same manner as Viscum; the shoots extend to a considerable distance, the growth from one seed sometimes covering a whole plant. Chemical experiments have proved that these parasites have a peculiar eliminating power; Loranthus, although not of a milky nature, can establish itself on a species of the Bread-fruit, which is full of a milky juice. Viscum was found to contain twice as much potash, and five times as much phosphoric acid, as the wood of the Apple-tree on which it was growing. Some species of Loranthus are said to be used as medicine in Brazil; some in Java have large leaves, of a dull, pale, grey colour beneath. L. *tetrandus* yields a black dye in Chile. Nuytsia *floribunda* is an exception to the usual habits of this tribe, being a shrub growing on the ground; the flame-coloured flowers come forth in great abundance, and caused it to be named the Fire-tree by the colonists of King George's Sound. N. *ligustrina* grows in the arid parts of the Blue Mountains, west of Port Jackson, in Australia. Misodendron belongs to the Antarctic regions, and was discovered amongst the few shrubs and trees on Hermite Island, west of Cape Horn, at the southern limits of arborescent vegetation on the globe.

This Tribe is nearly equally dispersed through the Tropics of Asia and America; it is much more rare in Africa, two species only known in the equinoctial countries, and six at the Cape of Good Hope. A few have been discovered in the islands of the South Seas, and in Australia. Loranthus abounds in Java; L. *europæus* of south Europe connects the tropical portion of these plants with the solitary British species Viscum.

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the Madder Tribe

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RUBIACEÆ.

THE MADDER TRIBE.

Trees, shrubs, and herbs: the leaves are simple, entire, opposite, and having stipules between the leaf-stalks, or in whorls around the stem and without stipules. The flowers are variously arranged, usually in clusters. The calyx is adherent, whole or divided at the top; the petals are flat, or tubular at the base, regular, with a definite number of divisions, equal to those of the calyx. The stamens rise from the corolla, and are alternate with its segments. The ovary is below the corolla, usually two-celled, sometimes many-celled; the style single or double; the stigma simple or divided. The fruit is whole or splitting into two parts, dry or succulent, two or many-celled. Seeds two or many, with horny albumen.

The characters of this order are clearly marked, but there exists considerable affinity with the Honeysuckle and the Composite tribes.

Poisonous, tonic, stimulating, and dyeing properties are contained in the varied plants of this extensive tribe.

Rubia and its immediate allies form a herbaceous section of the Order, with angular stems and whorled leaves, possessing very little beauty of form or colour. R. *peregrina* (1) is the only British species, growing in sandy places in the west of England and Scotland; the creeping fleshy roots yield a red colouring matter, useful in dyeing. But the valuable Madder or Turkey Red is obtained from R. *tinctoria*, the chief culture of which is in Holland and Turkey, affording a large supply of red dye for wool and cotton. R. *cordifolia* is the madder of Bengal; another species is used in Chile. Asperula *odorata* (2) is a sweet-scented plant, frequent in moist, shady places, particularly in Scotland; retaining its fragrance when dried, for a long time. The different species of Galium are common in various localities throughout England; none are of value. In the larger section of the order are some very important plants; the several kinds of Cinchona, in Peru, yielding medicinal bark; the small creeping-rooted Cephælis *Ipecacuanha*, in the damp forests of Brazil, esteemed for its emetic qualities; and

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1. Rubia *peregrina*, *Wild Madder*. Britain.
   1A *Flower*. 1B *Pistil*. 1C *Fruit*.
2. Asperula *odorata*, *Sweet Woodruff*. Britain.
3. Coffea *Arabica*, *Arabian Coffee-tree*. Yemen.
   3A *Seeds*. 3B *Section of Fruit*.
4. Mussœnda *macrophylla*, *Large-leaved Mussœnda*. South America.
   4A *Flower*. 4B *Pistil*.
   4C *Section of Ovary*.
5. Ixora *coccinea*, *Scarlet Ixora*. East Indies.
6. Coccocypselum *Tontarea*. Guiana
   6A *Fruit, open*.
   6B *Cross section*.
7. *Fruit of* Galium.

numerous other species of medical value. But the most extensively useful of the whole tribe is Coffea (3), first discovered in the mountains of Yemen, in Arabia, in the thirteenth century; two centuries later it was imported into Egypt, thence to Constantinople, and afterwards gradually into all the countries of Europe. Originally exceedingly limited in its place of growth, it has become widely diffused in cultivation, and still more widely dispersed by commerce. Arabia, however, still produces the best Coffee, in its dry climate, and on the arid soil of the mountain slopes. The hard, horny albumen of the seed, when roasted and ground, produces the stimulating and refreshing beverage. Mussœnda *macrophylla* (4) has the singular property of enlarging one of the sepals of the calyx, on each of the three branches of the flower-stalks, after the flower has fallen, one lobe acquires the size of a leaf, but is of a pale colour. Calycophyllum, also, has this peculiarity. Ixora (5) is one of the flowers employed by the Hindoos for the ornament of their temples; all the species belong to the East Indies and China. Vangueria *edulis* produces a fine eatable fruit in India and Madagascar. Genipa *Americana* is a large fruit of South America, of pale green exterior, containing a dark purple juice of agreeable flavour. G. *Brasiliensis* has a fruit which is also eatable when preserved with sugar. The fruit of Sarcocephalus *esculentus*, the Guinea peach, is eaten in Sierra Leone. Coprosma extends to the most southern land of the globe; in Tasmania it yields a fruit called *native currants*. Nerteria *depressa* grows about the Straits of Magalhaens. Fever bark is obtained from several species: from Rondeletia *febrifuga*, in Sierra Leone; from Pinckneya *pubens*, in Carolina; from Hymenodictyon *excelsum*, in East India. Cinchona has an extensive range on the Andes, occupying a space of ten degrees of latitude on either side the equator, and spreading over the mountains between 3000 and 9000 feet of elevation; the different varieties of bark are red, yellow, and pale. The attempt to transport some of these trees to Europe, first made by Condamine, failed, by the wreck of the boat at the mouth of the Amazons, after a prosperous voyage of 1200 leagues down the river. Several of the herbaceous plants of this tribe appear during the rainy season on the mountains of India, at 6000 and 7000 feet. Hymenopogon is a parasite on other trees; Oldenlandia is used for a red dye; Kohautia grows in the hot valleys between the hills—this is also a native of Africa. Some species of Morinda are cultivated in the plains of India for their red dye. Of the poisonous species, Evosmia *corymbosa* seems to be one of the most powerful, Indians having been poisoned by using the wood as spits for roasting meat in South America.

True Rubiaceæ are natives of the northern countries of the northern hemisphere, of elevated regions on the Andes, and of Australia. Cinchona, and its allies, are natives of the Tropics, and other hot regions of the world. Pinckneya extends furthest north in North America, inhabiting the southern States.

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Day & Son Lithrs

The Valerian Tribe

VALERIANACEÆ.

THE VALERIAN TRIBE.

Annual or perennial herbs, occasionally of a climbing nature; the leaves are opposite, entire at the edges, or variously divided, generally crowded at the base of the stem near the root. The flowers are sometimes imperfect in stamens and pistil. The calyx is above the ovary; the lobes membranous, or converted into a feathery down as the seed ripens. The corolla is composed of one petal, of a tubular form, inserted into the top of the ovary, having from three to six divisions, either regular or irregular, sometimes spurred at the base. The stamens are from one to five, inserted into the tube of the corolla, alternate with its lobes. The ovary is below the calyx, with one or three cells; the style is simple, terminated by one or three stigmas, according to the number of the cells. The fruit is dry, not gaping when ripe, one cell bearing a seed, the others empty; the seed is solitary, pendulous, without albumen.

These herbs have most connexion with the Teasel tribe; but are distinguished by the absence of small leaflets at the base of each floret, and the want of albumen in the seed.

Aromatic and medicinal properties, and a strong scent prevail in the Tribe.

Valeriana includes several European species, two of which are frequent in England, in moist, marshy localities. V. *pyrenaica* is chiefly found in the south of Scotland. V. *dioica* (1) grows generally in bogs or wet meadows; it has a creeping perennial root, and flowers in June; the stamens and pistil are sometimes united in the same flowers, although usually in separate plants. The root is thought to possess slightly medicinal properties, inferior to those of V. *officinalis*, which is a larger plant, growing frequently about the borders of pools and rivers. In France, it is also very common in woods, especially in the neighbourhood of Paris, and the root is much employed in medicine. The species named *Phu*, from the Arabic, is the true medicinal Valerian of Dioscorides, and was highly valued by the ancients; the scent of this and of V. *officinalis* is extremely repulsive, but is so agreeable to cats, that the plants are with difficulty preserved from their attacks. The oil of the root is, however, in some instances of pleasant odour, and

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1. Valeriana *dioica*, *Marsh Valerian*. Bogs, England.
2. Fedia *olitoria*, *Corn-Salad*. Corn-fields, England.
   - 2A *Flower*.
   - 2B *Fruit*.
3. Centranthus *ruber*, *Red Centranthus*.
   - 3A *Flower*. England.
   - 3B *Fruit and Calyx*.
4. Nardostachys *Jatamansi*, *Spikenard*.
   - 4A *Flower*. Himalayas.
   - 4B *Fruit and Calyx*.
   - 4C *Section of Fruit*.

that of V. *celtica* is esteemed as a perfume; the roots are collected by the poor peasants, at a considerable risk, from the precipitous rocks on the Alps of Styria and Carinthia, and sold to the merchants, who pass them on from Trieste to Turkey and Egypt, and to all the Eastern nations, for their aromatic baths. V. *Hardwickii* is a native of the Himalayas, growing on the margins of fields and in fissures of rocks; it is about three feet in height; the stalk, and leaves, like most mountain plants, are hairy; the root-leaves heart-shaped, on long stalks, and decumbent on the ground; the flowers are small and scentless.

Fedia *olitoria* (2) appears in early spring in cornfields, and is cultivated in gardens as an useful salad-herb; the French use it commonly for this purpose. Centranthus *ruber* (3) prefers dry situations, old walls and chalk pits; on the cliffs of the Kentish coast it is not unfrequent, and remains in flower throughout the summer months.

Nardostachys *Jatamansi* (4) of the Hindoos was ascertained by Dr. Royle to be the true Spikenard of antiquity, mentioned by Horace as of extreme rarity and costliness, and by the Evangelists as "very precious," the price of the ointment poured on the head of Christ being "more than three hundred pence," the value of a whole year's earnings of a labourer in that time and country: it was not only reserved for the most solemn purposes of anointing, but considered as highly valuable in medicine. Dioscorides and Ptolemy describe the localities of the Indian Nard, which agree with those where it still grows on the mountains bordering Bootan. On the lofty ranges of the Himalaya it is found at an elevation of 9000 feet, amongst various alpine plants which can endure the rigour of a climate where the snow rests on the ground for six months. The roots are clothed with dark hairs, giving them the appearance of an ermine's tail; they are gathered together and brought down in large quantities, to be sold in the bazaars at Saharunpore and elsewhere, for the sake of the agreeable scent, as well as for medicinal purposes. Astrephia is esteemed in Peru for its healing qualities. Patrinia is a Siberian genus with yellow flowers, found also in northern India and Japan. Triplostegia of the Himalayas forms a connecting link with the Honeysuckle tribe, the flowers being furnished with a small involucre show peculiar resemblance to the Teasel tribe.

This Tribe exists in nearly all countries where the climate is temperate, but is rare in Africa and North America. It abounds in Europe, and on the mountains of South America and Northern India. Valeriana grows on the Andes at 13,000 feet.

OF THE
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Compositaceæ

The Composite Tribe

Day & Son Limited

COMPOSITACEÆ.

THE COMPOSITE TRIBE.

Herbaceous plants, shrubs, and trees. The leaves are alternate or opposite, without stipules, usually simple, but generally much divided. The flowers are collected in close heads on a common receptacle, surrounded by an involucre. Bracts are sometimes present in the form of scales on the receptacle. The calyx is above the ovary, and closely united to it. The upper portion either wanting or membranous, divided into bristles, hairs, or feathery down. The corolla is of one petal, either funnel or strap-shaped, four or five-toothed at the top, sometimes bilabiate (12). The stamens are equal in number to the teeth of the corolla, and alternate with them; the filaments are jointed. The anthers cohere in a cylinder. The ovary is one-celled, with a single ovule; the style is simple, the stigmas two, downy or bristly. The seed-vessel is small, closed, dry, crowned with the top of the calyx; the seed is solitary, erect, with no albumen.

This order has close affinity with Dipsaceæ, Campanulaceæ, and Lobeliaceæ.

Acrid, tonic, aromatic, and stimulating properties exist in these plants; some contain oil.

This is one of the most distinctly marked of the Natural Orders, more extensively known now than was the whole vegetable world to Linnæus; comprising upwards of 1000 genera, constituting about 1-10th of all described species, affording numerous plants of great utility either as food or medicine, and contributing largely to the embellishment of nature, from the lowly Daisy (1) to the richly-coloured Dahlia. The prevailing colour of the commoner flowers, as of Dandelion, is yellow, but the finer species include every hue in great brilliancy. Among the plants yielding food, Scorzonera (4) has a slender white eatable root, of so mild a nature that it is probable the idea of its curing the bite of a viper is erroneous. Helianthus *tuberosus* is the *Girasole*, or Jerusalem artichoke, Cynara *Scolymus*, the artichoke introduced to English gardens from the south of Europe more than three centuries ago; like others of this class, it can endure much drought, and in the extremely hot and dry summer of 1825, in France, it was almost the only vegetable that survived to supply the markets of Paris. Cichorium was described by Pliny, who knew that the Egyptians made it an important article of food, as they do at the present time; the Greeks received it from Egypt, and adopted the same use of it. C. *Intybus*, Succory or Chicory, is frequent on the borders of our fields: the variety with larger roots is of more extensive use, they being dried and made into coffee. C. *endivia*, Endive, imported from the East Indies in 1548, is a common ingredient in salads. Lactuca *sativa* is the wholesome

1. Bellis *perennis*, *Common Daisy*. Britain.
2. Agathea *celestis*. Cape of Good Hope.
3. Carthamus *tinctorius*, *Officinal Carthamus*. Egypt.
4. Scorzonera *hispanica*, *Viper's grass*. Spain.
   4A *Floret*. 4B *Seed*.
5. Catananche *cærulea*. South Europe.
6. Cosmea *bipinnata*. Mexico.
7. Zinnia *elegans*. Mexico.
   7A *Ray Petal*.
   7B *Disk Petal*.
   7C *Crested Scale of Disk*.
8. Centaurea *Cyanus*, *Corn Blue-Bottle*.
   8A *Stamens*. 8B *Seed*.
9. Elichrysum *spectabile*. Cape of Good Hope.
10. Calliopsis *bicolor*. North America.
11. *Floret of* Echinops.
12. *Two-lipped Floret*.

Lettuce, and a narcotic drug is obtained from it. The leaves of Helminthia *echioides* are boiled or pickled in Greece. Of the medicinal class, Artemisia *Absinthium* ranks high as an aromatic bitter tonic: its powerful qualities were known in the remotest antiquity, and the bitterness of Wormwood was proverbial. A. *Abrotanum*, the strong-scented Southernwood, is employed in some countries in making beer. A. *Dracunculus* Tarragon, of the south of Europe, is an addition to vinegar and pickles. A. *alba* and others form part of the pasturage of the herds of the Calmucks. Taraxacum, the Dandelion, has repute as a medicine, and contains sweet Mannine in the milky juice. One of the most popular of our native medical plants formerly was Anthemis *nobilis*, Chamomile. The flowers of Santolina *fragrantissima* are similarly used in Cairo. Tussilago, abounding in many parts of our isle, is a remedy for coughs, known as Coltsfoot from the shape of the leaves. Mikania is a powerful genus in Brazil. The oil contained in the fleshy root of Anacyclus *Pyrethrum*, of Spain, is a powerful stimulant. Eupatorium *glutinosum* of the Andes, a shrub five feet high, called *Matico* by the inhabitants of Quito, has excellent healing qualities; other species cure the bite of snakes. Some valuable dyes are extracted from several of these plants. Carthamus *tinctorius* (3), the Safflower of Egypt, is of ancient renown, and is still in constant use in that country. Its flowers yield a yellow dye, soluble in water, and a red dye, soluble in alkali, which affords every shade of red or pink to the silk dyers of Egypt and China. Being perfectly harmless when taken in small quantities, it is used in the East to colour bread and cakes yellow. A fine carmine may be obtained from the petals of the Dahlia. Centaurea *Cyanus* (8) is one of the plants of corn-fields throughout Europe; a pure blue juice can be expressed from the florets, but it is exceedingly evanescent, which agrees with the fact that these and other blue flowers are apt to change to white, and seldom retain their blue in the herbal. It is a large genus, spreading into Barbary, Egypt, and Persia. Various species furnish oil in their seeds. Guizotia *oleifera* is cultivated extensively in India; *Madia* in Chile and Europe yielding a larger proportion of oil than either Linseed or Olives. In the barren tracts of Africa grows the succulent Ceradia *furcata*, full of a fragrant resin. The Thistle class is of peculiar character and aspect, the foliage beset with prickles, the flowers of little beauty; the plants serve as food to the humblest of animals. It was of old considered a type of barrenness and neglect. The only exception to this degraded position in the vegetable kingdom is Onopordum *Acanthium*, selected as the emblem of Scotland. Carlina *acaulis* is a singular-looking plant on our chalk downs, the pale buff shining involucre placed like a star on the ground. C. *gummifera* was known to the ancients for the gum distilled from the flowers and root. Echinops, the Globe Thistle, bears its blue florets in the midst of a many-leaved involucre (11). The seeds of all are crowned with a feathery down, which transports them to a vast distance. The most remarkable instance of thistle growth is on the Pampas of South America. From Buenos Ayres westwards for nearly 200 miles is a region of thistles ten feet high, all derived from seed accidentally carried there from Europe. Elichrysum (9) is one of the *everlasting flowers*, the dry petals resisting the usual withering process; Gnaphalium affords the yellow and white *immortelles* for memorial wreaths. The largest leaf of British plants is that of Arctium *Burdock*. The hairs of the seeds of the common Groundsel are curious objects of microscopical examination.

These plants are scattered all over the world, in various proportions. The herbaceous genera abound most in cold regions; those of a shrubby nature are exclusively natives of hot countries. The trees belong entirely to the Tropics. In St. Helena the shrubs and trees are of this Tribe. Britain possesses 130 species, more than of any other Tribe.

LIBRARY
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Dipsaceæ

The Teazle Tribe.

F.T.del.

Day & Son, L

DIPSACEÆ.

THE TEASEL TRIBE.

Herbaceous plants and under-shrubs. The leaves are opposite, or whorled: the flowers are collected into a head at the top of the stalk, surrounded by a many-headed involucre: the calyx is adherent, membranous, slender, surrounded by a scarious involucel: the flower is of one petal, tubular, inserted in the calyx, parted at the summit into four or five lobes: the stamens are four, alternate with the lobes of the corolla: sometimes half of them are imperfect: the anthers are distinct: the ovary is one-celled, with one ovule: the style is single: the stigma simple: the fruit is dry, one-celled, closed, crowned by the star-like calyx: the seed contains a small portion of fleshy albumen.

The distinct stamens of these flowers distinguish them from those of the Composite tribe, with which they have much affinity.

The properties are unimportant.

Dipsacus is said to have been so named from the Greek word for thirsty, on account of the water sometimes collected in the hollow space formed by the united base of the leaves around the stalk, and hence the common name of Venus's kettle in some parts of England. D. *sylvestris* (1) grows frequently on waysides and banks of streams, with a stiff, prickly, branching stem, about four feet high. D. *Fullonum*, the Fuller's Teasel, is cultivated in the west of England for the sake of the bristly heads of flowers, the scales of which are stronger and beset with sharper hooked prickles than those of D. *sylvestris*: they are thus serviceable in raising the nap of woollen cloth; for this purpose they are fixed in rows on a wheel, against which the cloth is held whilst it revolves. The flowers are pale, and crowded closely together. The different species of Scabiosa are chiefly European; a small portion only are of a shrubby nature. The outermost row of flowers are generally the largest, which gives the appearance of the radiant flowers

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1. Dipsacus *sylvestris*, *Wild Teasel*. England.
   - 1A *Flower, magnified.*
   - 1B *Bract.* 1C *Seed.*
2. Scabiosa *succisa*, *Devil's-bit Scabious.*
   - 2A *Flower.* England.
   - 2B *Pistil and inner Calyx.*
   - 2C *Outer Calyx and Scale.*
   - 2D *Involucre.*
3. Knautia *arvensis*, *Field Scabious.* England.
   - 3A *Flower.*
   - 3B *Stamen.*
   - 3C *Seed and Calyx.* 3D *Calyx.*
4. Scabiosa *atro-purpurea*, *Sweet Scabious.* South Europe.
   - 4A *Seed and inner Calyx.*
   - 4B *The same with outer Calyx.*
5. Scabiosa *ochrolenca*, *Yellow Scabious.* Germany.
6. Scabiosa *columbaria*, *Fine-leaved Scabious.* England.

of the composite plants; in some species the petal is four-cleft, in others, five. S. *succisa* (2) is one of the few examples of a bitten-off root; the point of the root withering and stopping in its growth, small rootlets protrude from the sides. The flowers are all of equal shape, and not radiated at the edge. S. *columbaria* (6) grows on a limestone, chalk, or gravel soil, and together with the other species, are frequently found on chalk-downs, where they assume the usual dwarf habit of the plants which grow in such situations, the flower-stalk being diminished to an inch in height—thus exhibiting in miniature what may be seen on the Alps and other lofty mountains. S. *ochrolenca* (5) is very common by the road-side and in waste places in most parts of Austria and Bohemia. S. *atro-purpurea* (4) is a well-known favourite in gardens. Knautia (3), a name bestowed by Linnæus, in honour of a Saxon botanist, was at first applied to some plants of the Levant; it is now given also to the British species formerly called Scabiosa *arvensis* (3). S. *speciosa* grows in Cashmere and on the Himalayas. Some species of Dipsacus are found in Nepal and on the Neelgherries. Morina *Wallichiana* is one of the most beautiful examples of this tribe in India, bearing clusters of pink and white flowers around the stem, enclosed by four prickly leaves. Cephalaria is a genus belonging to Siberia, Germany, Switzerland, and the Cape of Good Hope.

The plants of this small Tribe are chiefly natives of the south of Europe, the Levant, Barbary, and the Cape of Good Hope, not advancing into hot or cold regions; most abundant in the Temperate climates of the Old World; unknown in America. None belong to the plains of India, but several are natives of the Himalaya at moderate elevations.

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The Style-wort Tribe

STYLIDIACEÆ.

THE STYLE-WORT TRIBE.

Under-shrubs and herbaceous plants; with watery, not milky juice. The hairs, if present, either simple, acute, or bearing a gland at the top. The leaves are scattered, sometimes in circles on the stalk, entire at the edges, smooth or hairy, the root-leaves clustered at the base of the stalk in those species which have no stem. There are no stipules. The flowers are in spikes, on branching stalks, or solitary, usually terminal, rarely from the base of the leaf-stalks. The calyx is adherent to the ovary, with from two to six divisions at the top, either regular or two-lipped, persistent with the capsule. The corolla is composed of one petal, the lobes irregular, rarely regular, with from five to seven divisions, imbricated in the bud, late in falling off. The stamens are two, the filaments united with the style, forming a long column; the anthers are double or simple, lying over the stigma, gaping by chinks. The ovary is two-celled, many-seeded, sometimes one-celled, often crowned with one or two glands; the style is single, the stigma simple or bifid, enclosed by the anthers. The capsule has two valves and two cells, or one only from the contraction of the partition. The seeds are indefinite in number, small, erect, sometimes stalked, attached to the axis of the partition; they contain fleshy, oily albumen.

These few plants have close affinity with Campanulaceæ and Goodeniaceæ, but the anthers affixed to the style clearly distinguish them.

No useful or remarkable properties are known to exist in these plants.

This small Tribe is interesting as forming a singular link with the Orchis tribe, otherwise of so very different a character; the combination of the anthers and the stigma is the one point of resemblance. Stylidium derives its name from the manner in which the stamens and style are united into one column; in this there exists a strong irritability and elasticity, which causes it to start suddenly aside on being touched. The stigma lies in a hollow cavity at the top of the column, nearly concealed by the anthers on either side. S. *glandulosum* (1) is of a half-

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1. Stylidium *glandulosum*. Australia.
   - 1A *Flower.* 1B *Calyx.*
   - 1C *Ovary and Glands.*
   - 1D *Pistil and Stamens.*
   - 1E *Section of Ovary.*
2. Forstera *clavigera*.
   Lord Auckland's and Campbell's Isles.
   - 2A *Leaf, magnified.*
   - 2B *Flower with plumose Stigma.*
   - 2C *Flower with imperfect Stigma.*
   - 2D *Anther.* 2E *Ovary and Gland.*
   - 2F *Section of Ovary.*

3A. *Flower of* Stylidium *lauricifolium.*
   3B *Seed, magnified.* 3C *Seed.*

4A. Stylidium *calcaratum.* *Stamens on Pistil.*
   4B *Capsule, open.*

shrubby nature; the hairs of the calyx bear small glands on their summits. All the known species of Stylidium are natives of Australia, either in New Holland or in New South Wales.

Forstera *clavigera* (2) grows in compact tufts in boggy and turfy places on mountains, very commonly both in Lord Auckland's and Campbell's Isles; the branches are leafy throughout their whole length, and send forth small roots from the base of the leaves. The flower is minute, bell-shaped, with a wide, short tube, the upper portion being variously parted into five to seven lobes, sometimes of unequal size. In some instances the corolla is undulated on the surface, and furnished at the throat of the tube with linear appendages like nectaries, but containing no honey. The column of the style and anthers is often encircled at the base by two crescent-shaped glands. The anthers are usually kidney-shaped; when these are imperfectly formed, the stigma is nearly hidden in the cavity between them. In the perfect flowers, the stigma becomes forked and feathery. The capsule before being fully ripe is fleshy and leathery, containing in its single cell from six to eight seeds. F. *sedifolia* inhabits the turfy parts of the mountain of Tongariro, in the northern island of New Zealand. Some species have been found in the morasses bordering the Straits of Magellan. Levenhookia and others are scarcely known beyond their native situations, where they were discovered by exploring travellers.

Australia is the principal region of this small Tribe; the greatest number of species being natives of swamps in New Holland; one belongs to Ceylon, another to the coast of Malabar, and another to the district of Silhet, in Northern India. Forstera inhabits the most southern isles of the Southern Hemisphere.

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Goodeniaceæ.

The Goodenia Tribe.

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GOODENIACEÆ.

THE GOODENIA TRIBE.

HERBACEOUS plants, rarely shrubs, without any milky juice, sometimes with simple glandular hairs. The leaves are scattered, rarely opposite, sometimes proceeding from the base of the stem, often lobed, without stipules. The flowers usually at the ends of the branches or stalks; generally distinct, in Brunonia collected in heads, surrounded by enlarged tracts. The calyx is usually above the ovary, rarely below, equal or unequal, three or five-parted, in Brunonia clothed with long hairs. The corolla is of one petal, more or less irregular, the tube sometimes split at the back, five-parted, usually divided into two lips; the edges of the three largest petals sometimes thinner than the centre, and folded inwards in the bud. The stamens are five, distinct, alternate with the divisions of the corolla, the filament jointed in Brunonia, as in some Compositaceæ; the anthers distinct or cohering, two-celled. The ovary is one or two-celled, rarely four-celled, with few or many ovules; the style is single, very rarely divided, sometimes hairy, the stigma fleshy, undivided or two-lobed, surrounded by or inclosed in a two-valved membranous cup. The seed-vessel is a capsule with solitary or numerous seeds attached to the central partition. The seeds have sometimes a thickened covering; they contain fleshy albumen; the solitary seed of Brunonia has no albumen.

This Order has some connexion with Compositaceæ, but the peculiar stigma distinguishes it from all others.

Goodenia which gives the name to this Tribe, was so called by Sir James E. Smith, in honour of his friend Dr. Goodenough, Bishop of Carlisle, a friend and patron of botanists and of natural history. G. *grandiflora* (1) is the finest of the species; the flowers have an agreeable scent; the two upper divisions of the corolla bend over the stigma, forming a kind of hood. Before the flower-bud is unfolded the style is of the same length as the stamens, the stigma is in an erect position, and the anthers shed the pollen into its hollow cup. When the flower is expanded the style lengthens, the stigma becomes two-valved rather than a cup, and the

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1. Goodenia *grandiflora, Large-flowered Goodenia.* New Holland.
2. Scævola *microcarpa, Small-fruited Scævola.* New South Wales.
3. Brunonia *Australis, Southern Brunonia.*
   3A *Flower, magnified.* New Holland.
4. Lechenaultia *formosa, Beautiful Lechenaultia.* New Holland.
   4A *Corolla, opened.*
   4B *Pistil and Stamens.*
5A. *Stamens and Pistil of* Goodenia *ovata.*
   5B *Ovary and Calyx.*
   5C *Section of Ovary.*
   5D *Seed.* 5E *Section of Seed.*
6A. *Pistil of* B. *sericea.*
   6B *Seed.*

stamens wither and bend outwards. G. *ovata* (5) is a nearly similar species. Scævola is the most extended genus of this tribe; S. *microcarpa* (2) the species best known in this country, was obtained from some specimens of the earths of Botany Bay in 1793, and may be now occasionally seen in our conservatories. S. *Lobelia* with white flowers is a native of the West Indies. S. *Kœnigii* and S. *Taccada* grow on the coast of the Bay of Bengal, and also along the shores of southern India; the young leaves of the latter are cooked and eaten; the Malays fabricate little toys and artificial flowers from the soft pith. Other species belong to the Moluccas.

Brunonia (3) was named in honour of Robert Brown, the learned botanist, whose skill and science first arranged and classed the plants of Australia. B. *sericea* (6) is the only other known species; in both plants the five-lobed calyx and the four tracts at the base are covered with long hairs.

Lechenaultia was so named after M. Lechenault, botanist to the French expedition under Capt. Baudin. It was introduced into England in 1824, and is an elegant addition to greenhouses, the scarlet flowers coming forth nearly at all seasons. The plant is of a shrubby nature, and the foliage gives it a heath-like appearance; the slender leaves are densely downy when young. The tube of the corolla is hairy at the base within; from the base nearly to the points of the two upper lobes, the tube is split open; whilst in the bud the side wings of the lower lobes are folded over their central firmer portions. L. *oblata* has orange-coloured flowers, and L. *arcuata*, yellow, and it was once supposed that the genus comprised only these shades of colour. But this theory, like that which limited Tropæolum to the red and yellow tints, has been annulled by the discovery of L. *grandiflora*, a very beautiful species, with a corolla of deep pure blue.

Dampiera *stricta* was found by Capt. Dampier in New South Wales in 1814, and brought home amidst large collections which he made during his voyages; its blue flowers are hairy on the exterior. Euthales and Velleia are genera containing only a few species with yellow flowers.

The few plants of this Tribe are natives of Australia, and the Islands of the Southern Ocean. Scævola extends into India, Africa, and the West Indies. Selliera inhabits South Africa.

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Tropæolum tricolorum.

Tropæolum Flower Tribe

Day & Son, Lithrs.

CAMPANULACEÆ.

THE BELL-FLOWER TRIBE.

HERBACEOUS plants, and under-shrubs, containing a white milky juice. The leaves are almost always alternate, simple or divided, without stipules. The flowers are single, on branching stalks, in spikes or panicles, or in close heads, usually blue or white, rarely yellow. The calyx is above the ovary, usually five-lobed, remaining over the seed-vessel. The corolla is of one petal, inserted into the top of the calyx regular, generally five-lobed, withering on the seed-vessel. The stamens are inserted into the calyx alternately with the lobes of the corolla, to which they are equal in number. The anthers are two-celled, distinct. The ovary is below the calyx, with two or more cells, containing many seeds. The style is simple, clothed with hairs, which collect the pollen of the anthers; the stigma is simple, or with as many lobes as there are cells in the ovary. The seed-vessel is dry, crowned by the withered calyx and corolla, gaping when ripe by apertures at the base or side, or by valves at the top. The seeds are numerous, attached to a plate in the centre; they contain fleshy albumen.

This Order is closely allied to Lobeliaceæ, differing chiefly in the regularity of the parts of the flower: with Compositaceæ also it has much affinity.

An acrid milky juice prevails in these plants, but the roots of some are wholesome. Campanula, which gives the name to the tribe, was so called from the resemblance of the flower to a little bell; it contains several species gracefully elegant in form, of pure transparent hue, and delicate texture. Our British portion of the genus adds considerably to the floral beauty of the country, wherever the soil and climate may be favourable; in the month of July, the abundance of C. *rotundifolia* (1) is a striking embellishment of the scene in the meadows of the valley, and on the rocks of the mountain throughout the Lake district of Westmoreland and Cumberland. It is very frequent in Scotland; the leaves are round only at the base, gradually becoming linear on the stem. C. *latifolia*, the giant bell-flower, is

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1. Campanula *rotundifolia*, *Round-leaved Blue-bell.* Britain.
   - 1A *Calyx and Pistil.*
   - 1B *Stamens and Pistil.*
   - 1C *Stamen.* 1D *Section of Ovary.*
2. Campanula *garganica*, *Mount St. Angelo Campanula.* M. St. Angelo.
3. Roella *ciliata*, *Ciliated Roella.* Cape of Good Hope.
4. Michauxia *campanuloides*, *Rough-leaved Michauxia.* Levant.
5. Canarina *Campanula*, *Canary Bell-flower.* Canaries.

6A. *Section of Ovary of* Campanula *bononiensis.*

7A. *Stamen and Pistil of* Campanula *medium.*
   - 7B *Section of Seed.*
   - 7C *Calyx, with Appendages.*

almost limited to the northern counties. C. *Rapunculus* Rampion was formerly cultivated for the sake of its white, sweet, pungent roots. Another species, with an eatable root, is C. *lilifolia*, which affords food to the Chinese. The root of C. *glauca* is considered a valuable tonic by the Japanese. C. *medium*, of Germany, was brought into English gardens about 250 years ago, was named Canterbury bells, and has remained a favourite ever since. The calyx has appendages which hang down bytween the lobes (7). C. *pyramidalis*, a native of Carniola, is a well-known ornament for halls, and in the mild temperature of Devonshire it continues to unfold its flowers on the tall spike till late in autumn, in the open air. In Holland, it is very generally trained to form a kind of screen before a window. Although blue is the prevailing colour of this genus, indeed of the whole tribe, yet there is one yellow-flowered species, C. *aurea*, in Madeira. Specularia is now made a separate genus; Venus's looking-glass, with its white or bright purple flower, is commonly to be seen in old-fashioned gardens. Wahlenbergia is an example of the capsules opening at the top: W. *hederacea* is a very delicate, trailing little plant, with pale flowers and ivy-shaped leaves, growing in boggy places in Wales and elsewhere; some larger species in hotter countries are used medicinally. Roella ciliata (3), named after a Dutch botanist, is one of several species from the Cape of Good Hope. Michauxia (4) displays a singular variety in the revolute petals, giving almost the aspect of a passion-flower; it was introduced from the Levant in 1787, but is now seldom to be seen, although deserving of more favour with gardeners than it receives, for it is recorded to grow to the height of six feet with many branches and abundant flowers. Canarina *Campanula* (5) was an early importation from the Canaries, and producing its six-lobed yellow and red flowers late in the season is a pleasing addition to the conservatory; the root is said to be eatable. This is one of the 310 flowering plants peculiar to the Canaries; the remaining 223 belong likewise to Africa. Phyteuma, an ancient Greek name, is now applied to a genus usually inhabiting lofty situations; P. *orbiculare* is found on our chalk downs; several others belong to the Swiss Alps, forming part of the close turf of the higher pastures. The roots of P. *spicatum* are eatable, and frequently used as a vegetable in Switzerland. Jasione *montana*, sheep's-scabious, is very common on dry sandy ground, or heaths, as at Tunbridge Wells. Cyphia is a native of the Cape of Good Hope; one species is a climbing plant, another yields an eatable tuberous root to the Hottentots. Glossocomia is a connecting link with the Nightshade tribe. Codonopsis is a native of Cashmere and the Himalayas; Codonopsis *rotundifolia* has a climbing stem, which is not common in this tribe; the calyx and corolla are both occasionally six-lobed, which allies it to Canarina.

This tribe is abundant in Europe, and in North America; in the hot regions it is rarely seen; on the Alps and Appennines, on the Caucasus and Altai mountains between 36° and 47° of N. latitude, the greater portion exists. At the Cape of Good Hope is another central locality for those genera chiefly whose capsules open at the top. Some remarkable species belong to the Canaries, St. Helena, and Juan Fernandez.