SPICILEGIUM

NEILGHERRENSE

OR

A SELECTION

OF

NEILGHERRY PLANTS.

DRAWN AND COLOURED FROM NATURE

WITH

BRIEF DESCRIPTIONS OF EACH; SOME GENERAL REMARKS ON THE GEOGRAPHY AND AFFINITIES OF NATURAL FAMILIES OF PLANTS, AND OCCASIONAL NOTICES OF THEIR ECONOMICAL PROPERTIES AND USES.

BY

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MEMB. IMP. ACAD. NATUR. CURIOS.. ROYAL RATISBON SO.

SURGEON MADRAS ESTABLISHMENT.

VOL. I.

PREFACE.

THIS work was undertaken partly to gratify the taste and wishes of some friends who had an opportunity of examining the original drawings and who, thinking it would be a pity to throw away so much labour and skill of the painter by publishing them as uncoloured outlines, urged the propriety of at least publishing a few coloured sets, in case any of the purchasers of the Icones should wish to colour their copies. The force of their arguments backed perhaps by the promptings of an anticipated ready sale for the work, induced me so far to depart from my original plan as to have 100 extra copies struck off and red: the great expense of colouring preventing my incurring the cost of a er impression.

Having gone so far it then became necessary to endeavour to add to their usefulness and interest by combining, in as popular a form as I could, some account of the Botanical families to which they belong and their connection with Alpine vegetation generally.

This I soon found a more difficult task to execute than I anticipated and, I greatly fear, the descriptive matter has become more scientific than was consistent with my first intentions or than is quite suitable to the tastes and previous information of many of my readers. I do not know that this need be a subject for regret, as possibly the perusal of the following pages may prove the means of inclining some persons to desire a deeper knowledge of the mysteries of the vegetable organization and economy than they supply, and induce them to have recourse to some of the more elementary works on Botany, written expressly for the elucidation of such matters.

Should such prove the case, I can, as the result of a good deal of experience, promise them a most enduring "feast of reason and flow of soul" of the purest and, in the right direction, most elevating kind! For who can study the wonful and mysterious operations of life and endless adaptations of organization not merely of the individual, but of the species wi
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man by the powers of the Telescope, not less perfect and wonderful to the reflecting mind are those brought to light by the Microscope. In either case all is perfection, with this difference, that in the former we witness his perfections on a scale of grandeur far too magnificent for the comprehension of our limited faculties, while with the other we are easily enabled to detect organic structure in objects so inconceivably minute as to be almost invisible to the naked eye. With the aid of the former the motions through space of the heavenly bodies, distant many millions of miles, can be measured with such extreme accuracy as to show that in the course of thousands of years their rates of progression has not altered even a second of time, while by the latter we are enabled to trace evidences of complex structure and organization in the filmy dust of the moth's wing, or the equally minute particle of matter constituting a grain of pollen. Nay further, we learn from its use, that so infinitely varied and so constant are the forms of these minute objects that, in many cases, the practised observer can, by marking their differences, detect the families to which they belong, and can even tell, by the shape of the red globules in a drop of blood, whether it was drawn from the veins of a man or a lower animal.

These are no doubt extreme cases and demand an amount of skill in the use of the instruments not easily attained, but much, very much that is deeply interesting, can be learned from either by the merest novice, and each renewal of the attempt to interrogate nature by their means, adds to the skill of the observer. Such then are some of the dishes composing the endless intellectual feast which nature provides for her votaries and of which she, most bountifully, invites all to become partakers.

The magnified figures in the accompanying plates make no pretensions to such perfection in displaying the minutiæ of organization, but even in them are exhibited points of structure which could not be made out by the naked eye, and for the most part show, on a sufficiently large scale to be easily followed, those more minute and intricate portions of the flower, seed vessel, and seed, employed in tracing among plants their relationships to each other: a knowledge which forms the basis of our present Natural System and which if ever the true Natural System of Botanical classification, now so ardently sought for by all philosophical Botanists, is discovered, must still prove equally useful not to say indispensable towards its acquisition.

As it is not improbable some of my readers may only know of "
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t Naturalists understand by it. I
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...o inform others what they do not well understand themsel... ...mple, opinion is divided on the question of the existence or non-existence Natural System, some maintaining that there really is one of nature's own ontrivance and others, that the, so called, "Natural System" is neither more nor ess than a human contrivance by which the most nearly related species are brought together and placed, as much as possible in juxta position. This last doctrine I for one reject as unphilosophical and utterly at variance with innumerable facts and indications of wise design and contrivance which every division of nature presents for our consideration and instruction: without, however, going so far as to deny that those who maintain the doctrine can adduce many strong arguments in its support.

Those who maintain the exis... of a Natural System set out by showing the admirable symmetry and just proportion which all nature's works, from the greatest to the least, present and bear to each other: and by tracing the delicate progression from group to group, family to family, and species to species, thence assume that there is not only a Natural System, but further, uphold the doctrine that there can be but ONE, justly observing, that it is impossible to suppose that ALMIGHTY WISDOM, if he admitted system at all into his works of creation, would execute them so imperfectly as to admit irregularities, much less a medley of systems. The object then, of the philosophical naturalist is, they maintain, to approach as nearly as our finite faculties will permit towards the realization of this one grand and sublime idea, the discovery of The Natural System of organized beings.

Two methods are now in use for the attainment of this end or rather, limiting the statement to the vegetable kingdom, for the solution of the problem, what is the natural system of plants? These may be respectively called the *Linear* and *Circular* methods.

The first, it is admitted on all hands, is essentially artificial and can never succeed in placing the most nearly related objects of creation in juxta position, thus, to some extent, virtually admitting the existence of a circular one and its superiority as being the more natural of the two. Necessity, therefore, not choice constrains its continued employment, rather as providing a convenient kind of cabinet or store room in which to store our daily accumulating facts, in an easily accessible form, to have them in readiness for use so soon as a more ...arrangement is discovered, than as affording such an arrangement itself.

method claim for it a higher deg...

rs by a complex but beautifully simple net-work of affinities ..
may so speak, with a similar net-work of more remote analogies, all of which
found to exist in every perfect circle and that these circles progressively dimin
in magnitude from the highest to the lowest, until we arrive at the last link of t
chain, *Species*. The primary circles are three, *Animals*, *Vegetables* and *Inorgan
matter*. Animals being the Typical circle, Vegetables the sub-Typical and Inan
mate matter the Aberrant; which last is made up of three minor ones the endles
modifications of Earth, Water and Air; each equally perfect, thus making together
a series of five.

ANIMALS again divide themselves into three lesser groups viz. *Vertebrate Animals*—having an internal bony skeleton—*Annulose* animals (insects, crabs, &c.) having a hard crust or, as it were, an external skeleton—and *Acreta* or soft molluscous animals having neither proper bone nor crust.

VEGETABLES in like manner divide themselves into three primary groups viz. *Dicotyledons* or *Exogens*,—plants increasing in size by the addition of layers of new wood to the surface, or from without. *Monocotyledons* or *Endogens*, plants increasing in size by additions from within, the arborious forms of which have at first a hard crust, increasing in thickness towards the centre by additions of woody fibre to its interior. And lastly, *Acotyledons* or *Acrogens* flowerless cellular plants. The third or Aberrant group of each of these kingdoms is again divisible into three perfect circles. The ACRETOUS circle of animals contains the *Acreta* proper—the *Mollusca* or slugs, snails, shell-fish, &c. and the *Radiata* or star-fish. The ACROGENOUS circle of vegetables in like manner naturally divides itself into *Fungi* or Mushrooms: *Protophyta* or Sea-weeds and Lichens: and *Acrobryous* or *Psendocotyledonous* plants including Ferns, Mosses, Hepaticæ, &c. The progressive blending between these circles in their own kingdoms is affinity. The more remote similarities or blending as it were of habits and properties often easily traceable between analogous circles of the two kingdoms is, the analogy mentioned as existing in every perfect circle.

Thus far the two kingdoms advance side by side and step by step together, presenting analogous groups in each. The Vertibrata represented by the Exogens—the Annulosa by the Endogens—the Acreta by the Protophta—the Radiata by the Fungi—and lastly the Mollusca by the Acrobrya or Psendocotyledonia.

But when we advance beyond this point and attempt to compare the Vertebrata and Exogens we are arrested at the first step. The former is

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of plants do we find analogous groups? I am unable satisfactorily to answer the question, but still I cannot help thinking as I shall by and by show that parallel circles or groups may yet be found, and probably, when once traced will prove as self evident, even to the most casual observer, as the animal ones now are. The same remark is applicable to the Annulosæ and Exogens, where the parallel circles have not, so far as I am aware, been traced in the two kingdoms, but probably may readily be so, when the attempt is made by a competent observer who has made himself acquainted with the Zoological system, which, in first principles at least, seems to have gone far ahead of the Botanical.

Dr. Lindley in his elements of Botany has presented us with sketches of two circular arrangements of plants; each perhaps superior to those of any of his cotemporaries, but in which, so far as my comparatively limited acquaintance with the subject of circular arrangements, and indeed with the relationships of the vegetable kingdom generally, enables me to follow him, he does not appear to have succeeded in bringing out the affinities and analogies of his vegetable circles so clearly as Zoologists have their animal ones. In this opinion I may perhaps be greatly in error and in venturing to express it may only be exposing my own ignorance of the subject, but still, such is the impression conveyed to my mind by their examination. The first series of analogies between the two kingdoms is however known, and when Botanists have succeeded in tracing the second it seems probable the subsequent ones will prove less difficult, as the mass of knowledge of vegetable structure and function already acquired, but hitherto only sparingly applied to such purposes, will supply many new elements well adapted for forwarding the work of systematic arrangement. Jussieu founded his secondary divisions, in the Exogens, on the absence or presence of petals and on their being one or more: hence his *apetalous monopetalous* and *polypetalous* groups: and his tertcary ones on the relative position of the ovary to the flower, that is, whether the stamens have an *inferior* (hypogynous) *superior* (epigynous) or *middle* (perigynous) attachment. DeCandolle has adopted this method with considerable modifications, but I do not think improvements as a natural arrangement, though well calculated to facilitate its use in practice.

Professors Lindley and Endlicher have each constructed arrangements of the natural orders, or Natural Systems of Botany, both very differer[illegible]
[illegible]ther and from their apparently more simple, though less natural predecessors.
[illegible] improvement they seem to have accomplished by the avoidance of what, may be called linear characters, which must inevitably, in some part of their course, become constrained and artificial; causing, like the Adjutant's measuring rod, the widest separation of brothers, simply because the one happens to be the tallest the other the shortest man in his Regiment. By allowing [illegible]
[illegible]circularity to their divisional characters. they have l[illegible]

bring together, under the name of alliances or classes, groups of allied orders which are occasionally widely separated by the procrustion operation of linear characters. But though much has, by these and other similar attempts been effected to improve our arrangements, I still think we are far behind Zoology through our not having yet discovered in our Exogenous and Endogenous groups, those almost self-evident secondary divisions or circles so clearly marked out by nature in the animal kingdom, and so ably taken advantage of by Zoologists, in working out their animal system.

To discover these, if they actually exist in Nature, appears in the present state of the enquiry to be the first and grand desideratum towards the discovery of the true Natural System of plants. In the mean time however, our established orders and genera being for the most part pretty nearly natural, aided by the convenient practical grouping now in use, serves all the purposes of a more strictly correct and philosophical arrangement, leaving us for the time, very independent of a better, and allowing us to proceed at our own pace, leisurely feeling our way, while searching for the long and ardently desired natural one. And it is in the hope that some of the readers of this exposition of what is wanted, towards the construction of the basement of the natural system of plants, may be induced to turn their attention to the subject and perhaps that some one luckier than the rest, may stumble on a clue which will lead himself or others to the desiderated point and enable him, by the formation of truly natural secondary groups or circles, to complete at least the lower tier of the edifice.

It only now remains for me to offer a few remarks on vegetable organization, with reference to its employment in the construction of a Natural System of Botany. These must unavoidably be brief and imperfect, and probably, so far as they go, little to the point, the ideas of Botanists on this obscure subject being far from precise or settled on a firm basis, especially in what relates to the comparative value which should be assigned to each part, engaged in the complex organization of an Exogenous plant.

The organ principally regarded as the basis of all our attempts to obtain a natural arrangement is the Embryo, when present, taken in connexion with the plant which springs from it, whether, in short, it is mono—or di—cotyledonata by being origin to an Endogenous or Exogenous plant or is altogether absent as in Acrogens; plants still further distinguished from those of the two higher groups by their Cellular texture and the nearly total absence of vascular tissue.

Dicotyledonous or Exogenous plants have a woody stem, varying in solidity with their age from the tender herbaceous annual up to the almost stony hard-iron wood tree: increasing, with some exceptions, in thickness by the layer, of new wood, forming

zones round the axis: these zones are interseeted transversely by medullary rays radiating from the central pith. Occasionally, as above hinted, increase of thickness does not take place by means of annual Zones, the wood at whatever age appearing to consist of a single homogeneous zone. Dr. Lindley has taken advantage of this circumstance and brought together most of the families in which it occurs to form his group of *Homogens* distinguished by the Endogenous structure of their wood. Descending still lower in the scale we come to two groups of cellular plants, the *Rhyzanths* mushroom like plants, and the *Podostemons*, sea-weed like plants, agreeing with algæ in almost every thing except their fructification.

The leaves of Dicotyledons are, usually attached to, and separate from the stem by an articulation and are reticulated, that is their veins anastomose and form a net work, but this is not quite absolute as it is wanting in the leaves of most of the Gymnosperms.

The flowers are for the most part quinary in the number of their parts and are generally furnished with both calyx and corolla; but departures from both these rules are frequent: most of the Homogens have ternary, and many families quaternary flowers, while numbers have no corolla.

The seed is usually enclosed in a pericarp, but here also a striking exception occurs, the whole of the coniferus family, forming Lindley's *Gymnosperms* having naked ovules and seed, a privation combined with some interesting peculiarities of the Anatomical structure of the whole plant. The seed itself is either perfect or imperfect, that is, is furnished with an Embryo having two or more opposite cotyledons, or is sporulose: imperfectly developed as in Rhyzanths. The Embryo also is perfect or imperfect, with or without albumen. The albumenous ones are *intra* or *extra* albumenous, enclosed within the albumen like the yolk within the white of an egg, or placed on the outside of it, as in the case of the curvembryate orders.

From this description, brief and imperfect as it is, we find there are five modifications of structure, as regards vegetation, forming so many distinct groups. 1st Exogens as generally understood with the wood in Zones or concentric circles: 2d Homogens, first associated as a distinct group by Dr. Lindley: 3d Coniferæ or coniferæ: 4th Rhyzanths having more the structure of Fungi than perfect plants and 5th Podostemons which seem to have an anatomical structure nearly allied to algæ, but which Mr Griffith has determined, from actual dissection of the seed, to be dicotyledonous. Then as regards the structure of the seed, there are exalbumenous and two modifications of albumenous Embryos; and a fourth where it is imperfect. The albumen, moreover, greatly varies in quantity, being sometimes very abundant with a minute Embryo, varying thence to a large embryo and very scanty albumen.

All these variations are available for the purposes of classification and doubtless when thoroughly investigated, with special reference to this object, will furnish very sufficient secondary circles. The zoned angiosperms *Zonagens* may then perhaps be found to represent the Typical circle, the parallel or analogy of Mammalia; the *Homogens* the sub-typical, the parallel of Birds; while the *Gymnogens*, the Rhyzanths *(Hysterogens)* and Podostemons *(Protogens)* would unite to form the aberrant circle. In this case the first would represent in the Exogenous circle, and have for its analogies in the general system of plants, the Dicotyledons the 2d the Monocotyledons, the 3d the Acrobrya or ferns, the 4th Hysterophyta or Fungi, and the last the Protophyta or sea weeds. Here we have a series of apparently circular groups all based on anatomical structure and physiological peculiarities, without reference to the anatomy of the seed, except in so far as regards the embryo. Whether these when properly analysed will prove perfect circles is a point still to be ascertained. It is a difficult enquiry and the whole subject is far too deeply involved in obscurity for me to offer any opinion in anticipation, beyond the passing remark that these groups have a circular appearance and give promise that, though they may not supply all we want, yet that their thorough investigation may put us on the right path and speedily enable us to reach the long and anxiously sought for goal.

Endogens have a stem increasing in thickness by additions of new matter to the centre, made up of vascular and cellular tissue, without distinction of pith, wood, medullary rays, or bark: the cellular tissue being traversed by bundles of vessels, often, as in all the arboreous forms, Palms, the surface first becoming hard and woody or as it were crustaceous. Leaves with parallel veins connected by smaller transverse ones, usually sheathing at the base and not readily separating by articulation. Flowers usually ternary, with both calyx and corolla, but sometimes both series so closely resembling each other in colour, size, texture, and form as to be undistinguishable; or occasionally they are imperfect or altogether wanting. Seed in a pericarp. Embryo furnished with albumen or rarely exalbumenous, with one Cotyledon, or if more, alternate, (not opposite as in dicotyledons) the radicle enclosed within the Embryo through which it bursts in ger-

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From this general description it would appear there is a uniformity of structure of both the vegetation and seed, little favourable to the formation of well defined groups. This however on closer inspection is not found to be the case as regards the habit and vegetation of several tribes. We have for example the Lilaceous class, as understood by Redoute, including nearly all the gay flowering herbaceous forms. The palms. The Retose families of Lindley, represent-ing the Homogens, generally composed of climbing shrubs with homogenous wood ... foliage but monocotyledonous seed. The Aroideous families forming

ly the Glumaceous. How far these five groups are strengthened by ons in the conformation of seed, I am as yet unable to say, not having that attention to the subject which it requires, but I apprehend when they e closely examined, with special reference to this enquiry, that many points firmation of their stability will be found and, with their aid, a series of ct circles be discovered presenting striking analogies with others referable ie exogenous circle. Until however this is effected Lindley's very practical, ink also most natural distribution of these tribes, leaves little to be desired the practical botanist.

On the last great division of the vegetable kingdom the *Acrogens* or Cryptogamic plants I have nothing to add to what I have already said. This group certainly forms the aberrant circle, and like the analogous circles in the animal kingdom is made up of three smaller ones, each of which seems complete, though all require verification.

For those wishing to acquire a deeper insight into the science of plants than these pages can possibly supply, I would particularly recommend the study of Dr. Lindley's Elementary Botanical works which are by far the best in the English language. His recently published Vegetable Kingdom I have not yet seen, but it is very highly spoken of by two of my Correspondents who have. In its arrangement, I learn, he has considerably departed from both those referred to above, as given in his Elements and Natural System, falling back in a great measure on the plan of Jussieu, but greatly improved. To those desirous of becoming acquainted with the first principles, and many of the details of the circular system of classification, Swainson's volumes of Lardner's Cyclopædia are the only easily procurable text books and are among the most interesting volumes I ever read on Natural History.

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NEILGHERRY PLANTS.

I. RANUNCULACEÆ.

This is an extensive and beautiful family of plants, many of which, such as the Clematis, Ranunculus, Anemone and Larkspur, rank among the most admired favourites of the flower garden and arbour. Its species abound in Extra-tropical countries, but are of such rare occurrence within the Tropics that, so far as I yet know, there are not above 12 or 14 found, truly indigenous, in the whole of the Indian peninsula, the flora of which amounts to probably not fewer than 5000 species of flowering plants, of all descriptions, or it stands in the ratio of about 1 to every 400 species found within the same limits. The paucity of Ranunculacious plants, within the Tropics, may be further shown by comparing them with the Flora of the whole world: thus, assuming that there are 600 species of Ranunculaceæ, and that there are 80,000 species of flowering Plants, they then stand in proportion of one to every 133 species.

According to published lists, the Indian peninsula, within an elevation of 500 feet above the sea, can only claim one species (*Naravelia Zeylanica*) and that of rare occurrence within these limits. This plant, which abounds at the foot of the Hills, is an extensively climbing shrub so nearly allied to *Clematis* as almost to require a Botanist to distinguish them. Such being the case, it naturally follows that the next in succession should be a *Clematis*, and such in fact is the case, *Clematis Gouriana* (Nos. 1 and 2) being frequent on the table-land of Mysore and also on the eastern slopes of the Neilgherries, at an elevation of between two and

three thousand feet. None of the other species found on these Hills, except perhaps *C. Munronii*, which I found in the jungles below Sispara descend much below six thousand feet of actual elevation, though all occur within a few hundred feet above that limit.

Continuing our ascent of the Neilgherries, the next species that presents itself is the *Clematis Wightiana* (No. 3) which abounds in the thickets about Kaity and along the road from thence to Ootacamund. The *Anemone Wightiana*, begins to show itself occasionally about Coonoor, but is no where frequent until we have nearly attained the level of Ootacamund, where in the pastures, especially on moist ground, it becomes most abundant, but still ascends to the highest range of the Hills. The species of *Ranunculus* are of rarer occurrence, two species being generally met with in clumps of jungle, and the third (*Ranunculus reniformis*) is sparingly scattered over the higher pastures on the more elevated hills and, in such situations, is well calculated to remind the European sojourner of the Butter Cups which so charmingly variegate the Hill-side pastures of our Father Land. It is also met with in swampy grounds about Ootacamund.

The number of truly native species on the hills, so far as yet found, amounts only to nine or perhaps ten. Thirteen are described in our Prodromus, but three of these I have since satisfied myself are introduced, namely the *Adonis* (Pheasant's eye) and two species of *Delphinium* (Larkspur.) The remaining plant excluded from the present list is *Anemone dubia* which I have ascertained to be a mere variety of *A. Wightiana*. These nine are referable to five genera, namely, *Clematis* 3, *Naravelia* 1, *Thalictrum* 1, *Anemone* 1, and *Ranunculus* 3. In still further proof of the extra tropical character of this family I may mention, that Dr. Royle enumerates in his Illustrations of the Himalayan Flora, no fewer than 72 species of *Ranunculaceæ* found on the Himalayas and in Cashmere.

CLEMATIS. *Linn.*; (*Traveller's Joy—Virgin Bower.*)

Involucre none or resembling a calyx, and placed under the flower. Sepals 4-6, coloured, in æstivation either valvate or with their edges bent inwards. Petals none, or shorter than the sepals. Stamens numerous. Achenia several in each flower, terminated by a long tail. Seed erect.—Perennial plants with opposite leaves, which are simple, trifoliate, or once or twice pinnate, with a terminal leaflet.

This is a fine genus of beautiful climbing plants,—all the species of which seem well adapted for arbours,—and in Europe are much employed for the formation of these retreats, (hence I presume the old English names) as well on account of their rich foliage as for the profusion of their flowers a feature long preserved by the beautiful silky hairs of the long feathery tail of their seed, (a rude idea of which I have attempted to convey in Plate No. 2), a mark which readily distinguishes this section from the rest of the family. The genus *Clematis* includes about 150 species which are scattered all over the world. The flowers are apetalous with petaloid sepals. Naravelia differs in having both Calyx and Corolla.

1. 2. Clematis Gouriana (*Roxb.*) climbing: leaves pinnate or bipinnate; leaflets ovate-lanceolate, acuminated, cordate at the base, 3-or obscurely 5-nerved, entire or with a few coarse serratures: young branches angled, and peduncles, and oblong achenia pubescent: sepals revolute.—*W. and A. Prod. p.* 2.

This beautiful species flowers during the cool season. At this time, January, it is in full bloom in the jungles below Coonoor, where it may be seen climbing to the tops of the highest trees completely covering them with such a profusion of white flowers as almost to conceal the tree that supports them. In Mysore it is of frequent occurrence in the dense thickets surrounding most of the hamlets of that province.

3. Clematis Wightiana (*Wall.*) climbing: leaves pinnate; leaflets not wrinkled, very villous and soft on both sides, coarsely serrated, cordate at the base, palmately 3-lobed, the middle lobe the longest, or divided again into 3 ovate-lanceolate segments: young branches, peduncles, and flat achenia, pubescent: sepals ovate, outside very pubescent, inside glabrous: filaments hairy.—*W. and A. Prod. p.* 2.

This species is less frequent than the preceding, but is abundant among the brushwood of clumps of jungle about Ootacamund: also on the road side above Kaity and on that leading from Southdown round the foot of Elk Hill. In the latter station I met with it in the greatest perfection. It is readily distinguished by its soft almost woolly pale green leaves.

I may here remark that the colourist has represented them of too deep a green, for which, however, I can scarcely blame him as I found it very difficult to obtain the proper tint.

ANEMONE. *Wind Flower.*

Involucre 3-leaved, distant from the flower, the leaflets variously cut. Sepals 5-15, petaloid, imbricated in æstivation. Petals 0. Stamens numerous. Achenia numerous. Seed Pendulous.—Herbaceous plants with a perennial root. Leaves radical, stalked, more or less cut or lobed. Scape, when branched, bearing involucres at each of its divisions.

Of this genus nearly 100 species have been described in recent Botanical works. They are for the most part herbacious with perennial roots, and, generally, can be at once distinguished by their flowers having no distinct calyx, the floral leaves being all petaloid: hence it is called a petaloid calyx. By this mark as well as by habit, or general appearance, they are readily distinguished from their next neighbour in the Botanical system, Ranunculus, which has a regularly formed Calyx and Corolla.

Some of them are much cultivated in gardens and under the operation of skilful horticulture have become so completely doubled, that all the stamens and pistils have been changed into petals. In this state, however monstrous in the estimation of Botanists, they are certainly most beautiful objects and deservedly great favourites in the eyes of the florist: many of them, especially the *Anemone coronaria*, when in that state, being variegated with the richest tints. Under such a course of treatment it appears to me, the one here figured might be made to undergo that change and become one of the most choice garden flowers to be met with on its native mountains. This change might probably be brought about by transferring roots to the rich soil of the garden and preventing them, flowering for a season or two, by the simple operation of stopping, a practice which has the effect of strengthening the roots. At the end of the season when the leaves wither, they should be taken up and kept for a few weeks in a dark place, and again planted. As the roots are perennial this practice would probably in a few seasons effect the desired change, after which they can be propagated by dividing the root. For obtaining new varieties, plants are raised from seed, taken either from single or partially double flowers, and treated as above, taking up the roots when the leaves wither.

4. ANEMONE WIGHTIANA *(Wall.)* clothed with silky hairs: leaves on very long petioles, tripartite; divisions very deeply 3-cleft; segments cuneate, deeply 2-lobed; lobes cuneate, irregularly inciso-serrated: involucral leaves subsessile, deeply 3-cleft; divisions 3-cleft; segments linear-oblong, cut and serrated; sepals 6-8, elliptic-oblong: achenia glabrous: style hooked, persistent.—*W. and A. Prod. p.* 3.

Frequent in pastures about Ootacamund, but also generally distributed over the hills. Flowering in May and June. Flowers white within purple exteriorly. During these months it is certainly one of the greatest ornaments of the hills. I have not heard of its being applied to any useful purpose, though it may not be destitute of useful qualities as some of them are known to possess these.

RANUNCULUS. *Butter Cup. Crow-foot.*

Sepals 5, not free at the base, deciduous, imbricated in æstivation. Petals 5, rarely 10 or more, the claw furnished inside with a nectariferous concave little scale. Stamens and styles numerous. Achenia ovate, pointed, somewhat compressed. Seed erect.—Herbaceous plants with annual or perennial roots. Leaves mostly radical; cauline ones placed at the base of the branches and peduncles.

This genus ranks very near the former in the Botanical system agreeing with it in its herbacious character, its perennial roots, the form of its flowers, and structure of its seed, but differs in having a perfect Calyx and Corolla, in place of a petaloid or corolla-like calyx, and the seed erect, not suspended in their cells as in Anemone. Like *Anemones* these plants frequent pastures, shady woods, and moist soils near water, and they equally, but more energetically, participate in the acrid properties of the family. Like them under proper cultivation they become double, and in that state are equally prized as garden ornaments. Of those found on these Hills only one, *Ranunculus reniformis*, seems well adapted for the garden. It grows in open pastures, has thick fleshy roots, is naturally furnished with numerous petals, about 12, and, probably, treated as above would soon shew a tendency to increase the number.

The *Ranunculus* when thoroughly doubled is a fine flower, especially when richly variegated. Formerly they were in much greater repute as garden ornaments than in the present day, when gardens are stocked with such a multiplicity of new flowers brought from all parts of the world, but I almost doubt whether the lovers of fine flowers have not sustained a loss in discarding them to so great an extent as they have done from the Flower border: and I should not be surprised, ere long, to see them again taken into favour when the fashion for the large and gaudy Dahlia and such like has somewhat abated, and that for more modest, but not less beautiful, objects has resumed its place among the admirers of really fine flowers. Of this I, at all events, feel quite certain, that I have never on the Neilgherries seen a Dahlia that would bear comparison with Ranunculuses and Anemones I have seen in even second rate Cottager's gardens in England.

5. RANUNCULUS WALLICHIANUS *(W. and A.)* erect, hairy: radical leaves roundish ovate, rounded or somewhat cordate at the base, coarsely crenated; lowest scape-leaf oblong, toothed, narrowed at the base into a petiole; upper ones nearly linear: petals (yellow) numerous, 10-13, twice as long as the patulous calyx: heads of fruit globose: achenia oblong, turnid, minutely dotted: style nearly straight.—*W. and A. Prod. p.* 4.

This species is generally met with in moist woods, is of a procumbent habit, with small flowers, flowering in May and June after the rains of the South-west monsoon have commenced. It is however found at other seasons, especially during rainy weather. Another species is found at the same season and so much resembling this one, that, to the unpractised eye, it is not distinguishable, but is at once known by the seed, which, in this, is furnished with numerous little tubercles, in that, is quite smooth and without asperities of any kind.

II. MAGNOLIACEÆ.—*Champ, Champac.—Champany.*

The species of this family are for the most part large trees or shrubs, forming a remarkable contrast with those of the preceding family, and on this account apparently most unnaturally grooped almost side by side with it. And yet the ablest Botanists who have given their attention to the grooping of natural families, so as to form a series in which those most nearly associated by the structure of their flowers and fruit should stand nearest each other, have hitherto failed in discovering for it a more suitable place in the vegetable system, a fact not to be much wondered at, as in the structure of their flowers and fruit, the two families so nearly associate that, but for other circumstances, Magnolias might almost be looked upon as gigantic Arboreous Ranunculuses.

The bulk of this family are natives of North America, a few only being found in Asia, and none, so far as is yet known, in Europe or Africa. Several are found in China and Japan, a few in the Himalayah range, three or four in Ceylon, and two or three on the mountains of the Indian peninsula. Generally they are distinguished by the fragrance of their flowers, which has led to the introduction, and extended diffusion over India, of the Champac as a sacred tree the flowers of which, when procurable, are offered by the natives at the shrines of their Idols.

The tree here represented is the only one found on the Neilgherries and there attains the size of a large timber tree the wood of which however is only used in house building. Owing to its hygrometric properties it is not adapted for other purposes as it swells and contracts, according to the moisture or dryness of the atmosphere, to an unusual extent, even after long seasoning. When formerly writing on this family in my Illustrations of India Botany, I considered this distinct from the plant there figured under the name of *M. Palmyensis*, better acquaintance with this one, has led me to doubt the correctness of the opinion there expressed which was mainly formed on what I now find an incorrect figure and description.

MICHELIA. *Linn.*

Carpels arranged in a loose spike, of a consistence between leathery and fleshy, 2-valved, opening from the apex downwards. Seeds several (3-8), externally fleshy.—Trees. Leaves entire, petioled. Flowers axillary, generally fragrant, usually of a yellow colour.—*W. and A. Prod. p.* 6, *No.* 1.

This genus which is the only one of the family found so far south in India consists of large trees or considerable shrubs and may I believe generally be met with, where abundant, in flower nearly the whole year, but on the Hills are in greatest profusion during the rainy season. The flowers are usually rather large frequently with a tinge of yellow very fragrant. Those of the Neilgherry species are nearly white.

M. NILAGIRICA. *(Zenker)* Leaves elliptic oblong tapering to a point at both ends, glabrous; stipules and spathes silky petals from 9 in three rows stamens numerous shorter than the column of fructification, ovaries numerous, about 4 ovules in each: carpels warty, one or two seeded.

A large tree found frequent in the clumps of Jungle about Ootacamund. There are several very fine ones in the thicket immediately adjoining the Church the branches of one or two of them overhanging the road.

III. MENISPERMACEÆ.

This curious family consists, with few exceptions, of twining shrubs and is nearly confined to Asia and America, a few only having been found in other tropical countries. One is found above 3,000 feet of elevation on the Himalayas and one in Siberia. These I believe are about the only exceptions to its tropical character, doubtless others are found beyond the tropics, but still in warm latitudes where frost is scarcely known. The one here represented has the widest range of elevation of any I have met with in the Peninsula, ascending from the plains even to Ootacamund, where it is found in almost every thicket. One other species I have found on the Hills and only there, but so rare that I have only once seen it and then not in good flower, otherwise it would have been a more appropriate representative of the family for this work.

The order is in many respects peculiar and seems hitherto to have nearly set at defiance all attempts of Botanists to find a suitable location for it in the natural arrangement of the vegetable kingdom. I here retain it in the situation allotted by that most accomplished Botanist, Professor DeCandolle, though satisfied in my own mind it is not well chosen, from feeling convinced that premature and partial reforms are productive of greater injury to science than the errors they are intended to remedy.

Intense bitterness more or less combined with narcotism is the prominent quality of the Order as evinced by the well known Colombo root, and the notorious Cocculus Indicus in which the bitter principle of the family is combined with a less innocent narcotic property which it is said London Brewers impart to their Porter.

CLYPEA.

Dioecious. Calyx of 6 sepals in a double series, with 3-6 close pressed bracteoles. Corolla none MALE. Stamens united into a central column, dilated at the apex, bearing several 2-celled anthers; cell opening horizontally, placed end to end, and forming a ring round the top of the column. FEM. Ovary solitary. Stigmata 3 (or rarely 6?) Drupe obliquely reniform; not compressed, wrinkled round the margin Seed solitary, uncinate. Albumen fleshy. Embryo terete, of the same shape, and about as long as the seed —Twining shrubs. Leaves peltate. Panicles axillary, both male and female without cordate bracteas.—*W. and A. Prod p.* 14, *No.* II.

This genus is one of four or five appertaining to this family found in the Indian Peninsula and is easily distinguished from its congeners by its male flowers, the stamens of which are united into a single column forming at top a large capitate anther which opens round the upper margin for the transmission of the pollen. The flowers of this like those of the preceding order belong to the ternary form, that is, are composed of one or more whorls, each having three leaves. In this instance three such are shown in the diagram fig 8, while the centre ring may be supposed to consist of either one or two such verticels. In Cocculus there are 2 whorls of stamens each having a scale at the base, in this there are only three scales (fig 3) surrounding the column hence it seems probable that one whorl only unites to form the compound stamen.

CLYPEA *hernandifolia*. (W. & A.:)—Leaves ovate, rounded or scarcely truncate at the base, mucronulate, upper side glabrous, under slightly hairy; panicles about equal to the petioles, umbelliform; rays umbelliferous; pedicels very short: polleniferous ring 6-celled.—*W. and A. Prod. p.* 14. Frequent twining among underwood, in the clumps of jungle about Ootacamund particularly in low moist situations—It is equally frequent in similar situations on the Pulney mountains, but also occurs on the plains in moist shady jungles.

IV. BERBERIDEÆ.—*Barberry.*

This is a small family of finely flowering shrubs, natives of the temperate regions of both the Northern and Southern hemisphere. In the Indian Peninsula two species certainly occur, a third is said to be found in the Coorg jungles, but on that point there still seems room for doubt. Both are found on the Neilgherries, the one here represented being by far the handsomer of the two. Other nine genera are referred to the order but this is the only one found in Southern Indian. The peculiar distinguishing mark by which this family is separated from the rest of the vegetable kingdom is the curious anthers, which open like the lid of a snuff box to give exit to the Pollen, combined with a very perfect flower. The cinnamon tribe (*Laurineæ*) have similar anthers but very incomplete flowers in comparison with those of *Berberideæ*, and are in consequence far removed from them in our linear series of natural orders, but, notwithstanding, they have many points in common, showing a closer relationship than might at first sight be suspected—among these are the ternary arrangement of the flowers, the valved anthers, and single superior ovary.

The filaments of some, if not all the species, of this genus are endowed with a peculiar irritability, which causes them when touched at a certain point near the base to contract elastically and strike the anther against the stigma and in that way scatter their pollen on it. This property exists in both the Neilgherry plants. The properties of the wood are mildly astringent and bitter, and in the upper provinces an extract is prepared by boiling the wood which is highly esteemed by the natives on account of its medicinal qualities. In upper Bengal the fruit of two species are dried, like raisins in the sun, and sold as kistmisses in the bazars all over the country.

BERBERIS.—*Barberry.*

Sepals 3-6-6, deciduous, in a double row, accompanied externally with petaloid scales. Petals hypogynous, equal to the sepals in number and opposite to them, or twice as many; often furnished in the inside with an appendage at the base. Stamens hypogynous, equal in number to the petals and opposite to them: anthers bilocular, the cells opening elastically with a valve from the bottom to the top. Ovarium solitary, unilocular, containing 2-12 ovules, which are erect, or attached laterally to the inner margin, and forming there one or two rows: style sometimes lateral, short: stigma orbicular. Fruit baccate or capsular, indehiscent. Albumen fleshy or horney. Embryo straight, in the axis of the albumen: radicle pointing to the hilum: cotyledons flat.—Leaves alternate, without stipules.—*W. and A. Prod. p.* 15 *No.* 1.

The species of this genus, amounting to about 50, are nearly all shrubs or at most small trees armed either on their stems or leaves with numerous thorns. In those with thorny stems the thorns are considered a modified state of the leaves in which the parenchema or dilated portion is displaced and the ribs or veins have become indurated. Some Botanists propose dividing it, removing the plant here figured along with some others to form the genius *Mphonia* which however only differs in the petals wanting two glands at the base which the others have, a character considered altogether insufficient for the purpose. On this account the older name is here preserved. All the plants of this section of the genus are very handsome shrubs. The one figured is common on the hills and when growing in favourable situations attains the size of a small tree. A pale yellow dye is extracted from the wood of both the Hill species, a third species belonging to the Mahonia division with drooping racemes of flowers is, I am told, found in Coorg, and which I think I once saw

on the Pulney Mountains but not then in flower. The Pulney plant differs in habit from this in having diffuse rambling branches.

BERBERIS (MAHONIA) LESCHENAULTII (WALL)—Leaves pinnate; leaflets about six pair, ovate, nearly equal in size, slightly cordate at the base, repand with 5-8 thorny teeth at each side, about 5-nerved at the base; lower pair of leaflets close to the stem: racemes elongated, slender; bractoules at the base of the pedicel oblong, obtuse: petals with two distinct glands; filaments without teeth: berry globose, crowned with the evident style and stigma.—*W. and A. Prod. p.* 16.

As this is a true congener of Nuttal's genus *Mahonia* I preserve that as a subgeneric or sectional name. The plant is found in almost every clump of jungle about Ootacamund flowering during the South west monsoon but may generally be met with in-flower at other seasons though more rarely, the fruit ripens during the dry season and when fully ripe acquire a bluish purple colour.

V.—CRUCIFERÆ.—*Cabbage Tribe.*

This large and most useful family of plants, supplies man with many of his most esteemed esculents, among which may be named the whole tribe of cabbages, turnips, rape, mustard, cress, scury grass, radish, horse radish, &c., and to the flower garden, wall flowers, stocks, candy tuft, honesty and many others. But though it thus abounds in both useful and ornamental plants in the temperate regions of the globe, it scarcely merits a place in this work, three or four insignificant species being all that are found here where the one figured is the best looking of the set. Such being the case it seems useless to dilate on a family that can possess so little interest for the lovers of the wild flowers of our Blue-mountains. Though thus rare, even in this temperate climate, the family is a large one including little short of 1,500 species. A few however are found in warmer climates, the most curious and interesting of which is the so called *Rose of Jericho* (*Anastatica* literally resurrection flower) a native of the sandy deserts of Arabia, the ends of the branches of which contract during dry weather and form a ball which may be taken up and kept in that state for years. And at the end of that time, if the roots are immersed in water will re-expand, the flowers open, and in a few hours the whole plant appear as if it had never been out of the ground.

The family derives its name from the Latin word *Crux crucis* a cross with reference to the four petals spreading in opposite directions so as to form the appearance of a St. Andrew's cross, and by this mark they may always be known at a glance. They have besides six stamens four long and two short whence Linnæus derived his name Tetradenamea that is four powers, in allusion to the four long stamens.

CARDAMINE.—*Ladies Smock.*

Calyx connivent or somewhat patent, equal at the base. Petals with a claw; limb entire. Stamens distinct, without teeth. Siliqua sessile, linear, elongated, compressed; valves flat, nerveless, somewhat smaller than the increassated replum,* from which they usually separate elastically. Style short, or none: stigma nearly simple. Seeds ovate, without a border, forming a single series: podosperms slender. Radicle applied to the edge of the cotyledons (o□)—Leaves petioled, entire, lobed, or variously divided, often different on the same individual. Flowers white or rose-coloured.—*W. and A. Prod. p.* 19.

The species of this genus are very numerous and where they abound very ornamental, as for

* *Replum* is the frame surrounding the dissepiment, from which the valves fall off, and to which the placentæ are attached.

example the *C. pratinses* of English meadows, which, in spring, appear in such numbers as to whiten the fields where they grow, so as to give the appearance of bleaching greens; whence, it is supposed, it derived its English name of "Lady's Smock." The one here figured does not possess that recommendation, as it usually occurs but thinly scattered in woods and may generally be found in flower during wet weather at all seasons.

CARDAMINE BARBONICA (Persoon).—Leaves trifoliolate; leaflets hairy on both sides, particularly on the nerves beneath, petioled, ovate acuminated, unequal at the base, irregularly and sharply toothed, terminal one sometimes 3-lobed or divided into 3 leaflets similar to the others: silique erect.—*W. and A. Prod. p.* 20.

VI.—FLACOURTIANEÆ.

This is a small family of trees and shrubs, but on the limits of which considerable difference of opinion exists among Botanists, a subject on which much might be said were this the place for such disquisitions. Suffice it therefore to say that there are two nearly related families (*Bixaceæ* and *Flacourtianeæ*) which many Botanists consider quite distinct, but which others combine to form one large one. The preponderance of opinion is on the side of those who keep them distinct; but they, on the other hand, differ among themselves as to the genera that should be respectively referred to each, a fact which seems to indicate a degree of affinity quite consistent with their union and redivision into suborders, the course which Professor Endlicher has adopted in his Genera Plantarum. Mr. Bennett (Plantæ Javanicæ Rariores) has in a long and very elaborate article, under *Pholeros rhinanthera*, undertaken to throw more light on the subject and to reconcile the differences existing among Botanical writers on these two families: but after a copious adduction of evidence on all sides, has forgot to sum up, and, consequently, has left the question involved in about as great darkness as when he commenced. I learn however from a careful perusal of that article—1st, That Mr. Brown coincides with Dr. Blume in considering the genus *Hydnocarpus* as forming the type of a new order, to which the latter Botanist has given the name *Pangiaceæ*; derived from *Pangium* an old generic name of Rumphius.—2nd, That he agrees in opinion with those Botanists who think the two families ought to be combined, a view in which I can scarcely coincide, on his own showing, as he states the ovary of Flacourtia has several cells, with central ovules, while those of all the other genera have one-celled ovaries and parietal ovules, as in the accompanying figure. For this reason I conceive the order *Flacourtianeæ* should be retained, even though limited to the single genus *Flacourtia*. But supposing this difficulty got over by finding the partitions more or less inconstant, still I cannot help thinking the association of numerous plants having dry dehiscing capsules with others, equally numerous, having indehiscent baccate fruit, one that ought when possible to be avoided and that all those genera agreeing with *Bixa* in having capsular fruit ought to be brought together to form the order *Bixaceæ* while those with baccate fruit are ranged under the old *Flacourtianeæ*. Should this last course be adopted then the present genus can scarcely be retained, as at present placed, at the end of *Flacourtianeæ* from which it essentially differs in its fruit, being a many seeded nut, in place of a fleshy berry, but is left here until the question is decided one way or the other.

Little can be said regarding the uses or properties of *Flacourtianeæ*. The fruit of one or two species of *Flacourtia* are about the size of a cherry, and very palatable. In Ceylon

the berries of *F. inermis* are made into preserves. The seeds of *Hydnocarpus inebrians* have the property of intoxicating fish when thrown into water where they are—hence the name.

HYDNOCARPUS.

Flowers dioecious. Sepals 5; the two outer ones ovate; the three inner much larger, exceedingly concave, somewhat petaloid; æstivation twisted. Petals 5, æstivation twisted. Scales (abortive stamens?) opposite the petals somewhat fleshy, MALE. Stamens 5, in the centre of the flower; anthers flattish, nearly reniform; cells separated by the broad connectivum. No vestiges of a pistil. FEM. Stamens as in the male, but anthers without pollen. Stile 0. Stigma peltate, flat, closely pressed on the summit of the ovary and crowning it, 5-parted; each segment cuneate and deeply bifid. Ovarium globose; ovules numerous. Berry globose, crowned with the undivided portion of the stigma now thickened and erect (resembling a short stout style) and bearing the remains of its lobes. Seeds numerous.—Trees. Leaves glabrous; secondary nerves simple, connected with transverse small nearly simple and straight veins.—*W. and A. Prod slightly altered*

Until the discovery of the subject of the accompanying plate, this genus consisted of a single species the *H. inebrians*: a tree widely distributed over the shores of India and Ceylon. It is also said to be a native of the Eastern Islands, extending from Malabar Eastwards as far as Amboyna and Java, where we are informed it was found and described under the name of *Pangium* by Rumphius. It seems not improbable however that when Rumphius' *Pangium* is better known it will be found generically distinct as Roxburgh's *Gynocardia* assuredly is, though referred here by both Lindley and Endlicher. The one here figured so greatly resembles in general appearance the coast tree, that for a long time I thought them the same and felt greatly surprised at finding a coast tree at an elevation of 6,000 feet. This it was that first led me carefully to compare the two, when the difference in the structure of the flowers at once became evident and showed they could not be the same. In that two of the sepals are much smaller than the others, in this they are all equal: in that the petals are broad ovate fringed with hair, in this they are lanceolate and glabrous; in that the petals are furnished with a short broad densely hairy oval scale, in this the scales are linear lanceolate nearly as long as the petals, and merely ciliate, or fringed with short fine hairs: in that the stamens have long subulate hairy filaments recurved at the apex, in this they are short and glabrous: in that the anthers are short and reniform in this ovate oblong: in that the leaves are serrated marked below with numerous prominent veins, in this they are quite entire with few veins. This comparison might be carried further but enough has been said to show that they are amply distinct species.

Roxburgh's *Gynocardia* or *Caulmoorga* (the two names refer to the same plant), quite a distinct genus, has been, by both Lindley and Endlicher, erroneously, referred here as a synonym, and is by Meisner altogether over-looked or excluded from the order. Rumphius' *Pangium* has also been referred here by Endlicher but with what justice I have still to learn, for there is nothing in either his figure or description to justify such lumping, unless, which is probable enough, Blume has supplied what is wanting in Rumphiu's description to authorize its reduction to a synonym.

HYDNOCARPUS ALPINUS (R. W.)—Sepals all equal reflexed: petals ovate lanceolate glabrous: scales linear lanceolate as long as the petals, ciliated towards the apex: male-stamens 5, filaments much shorter than the petals, glabrous, anthers, obtuse pistil none: female-calyx corolla and stamens as in the male, but the anthers without pollen: style none: stigma peltate 5 parted, the divisions obcordate spreading, crowning the ovary.

A large ramous tree 70 to 100 feet high, not unfrequent in deep moist vallies of the Neilgherry hills about Koonoor and Kottergherry usually growing on the banks of streams. Flowering in July and August. Leaves alternate, ovate-acuminate entire glabrous, from four to six inches long and from 1 to 2 inches broad, at first red, afterwards deep green: fruit globose, about the size of an apple; clothed with short brown tomentum: seeds enclosed in a white fleshy pulp; testa dark coloured, hard; embryo enclosed in albumen, cotyledons foliaceous cordiform; radicle elongated pointing to the hilum.

H. INEBRIANS (*Vahl*) Sepals unequal, the three inner ones longer; petals broad ovate, fringed with soft white hairs: scales broad ovate, about half the length of the petals, densely hairy; stamens as long as the petals, filaments subulate, anthers broad reniform: pistil none: female as in the male, anthers without pollen.—*W. and A. Prod. p.* 30: *Wight's Illust.* 1 *tab.* 16.

A tree of moderate size frequent near the coast in Malabar and Ceylon, flowering at all seasons. Leaves alternate, ovate, acuminate, glabrous, crenulately serrated about 5 or 6 inches long and 1 to 2 inches broad: racemes axillary, short, few flowered fruit globose many-seeded.

VII.—VIOLARIEÆ.—Violet Tribe.

This, like the preceding family, consists for the most part of extra-tropical plants, a few only being found of strictly tropical origin. By far the greater portion of its species are herbaceous or low half shrubby plants, but larger shrubs or even small trees also occupy a place in its ranks. One of the latter is found in Ceylon, and most probably also on the continent, though I have as yet failed to recognize it. Of the truly tropical forms, two species are found in Coromandel, small decumbent plants with pink flowers, but so unlike the tree violet and heart's-ease, that no one unacquainted with the formation of these flowers could recognize their relationship. Others grow on the Andes in Peru still more unlike, and so much resembling a Stone-crop in the form of the plant that, not even an acute Botanist would, without the flowers and seed vessel, suspect them to be violets even in the Botanical sense of the term, which is much wider than common parlance admits. In common language, we have *the* violet *(Viola odorata)* the Dog violet *(Viola canina)* and a few others, but some florists do not admit that the Heart's-ease *(Viola tricolor)* is a violet, though one of the most perfect of the genus.

The Violacious plants form a numerous family, amounting to nearly 500 species. These are scattered over nearly the whole globe, but very sparingly in India. North America and Europe are their two grand centres, but they are also numerous in South America, both on the mountains and plains. On the Andes they present the appearance of small-rounded leafy little shrubs, not unlike some of the European stone crops (*sedum*), in Brazil shrubby and small arborious forms prevail. True violets are however of rare occurrence in the latter country.

VIOLA.—*Violet.*

Sepals five, persistent; æstivation imbricated. Petals hypogynous, five, usually withering, generally unequal; æstivation obliquely convolute. Stamens five, alternate with the petals, or occasionally opposite to them, inserted on the hypogynous disc or torus: anthers bilocular, introrse, closely approximated or united laterally to each other: filaments dilated, elongated beyond the anthers; two of them, in the irregular flowers, usually with an appendage at the base. Ovary 1-celled, with many (rarely one) ovules: style single, usually declinate, with an oblique cucullate stigma. Capsule three-valved, loculicide, bearing the placenta on the middle of the valves. Embryo straight, erect, in the axis of a fleshy albumen.—Leaves alternate, rarely opposite, with persistent stipules and an involute vernation.—*W. and A. Prod.* p. 31.

This genus includes at the present time upwards of 150 species. These for the most part are low growing herbaceous perennial plants, some, however, show a shrubby tendency. Two or three are found on the Neilgherries, but the one here figured is by far the most common, showing its pale blue flowers among the grass on all directions, rapidly propagating itself by means of runners, like strawberries. By an oversight of the draftsman, and want of room, these have not been introduced, and to that extent the figure is imperfect, but in other respects gives a good idea of the plant. It is in flower at all seasons. In general appearance this species much resembles the sweet scented violet but is destitute of fragrance. Of all the long list of species of this genus only two or three species are cultivated in the flower garden, namely, the Pansy or Heart's-ease (*Viola tricolor*) and the sweet scented violet (*Viola odorata*) the former most justly esteemed for the admirable blending of its colours, and the latter for its charming fragrance. There are many varieties of both in cultivation. The *Viola tricolor* derives its English name *Pansy* from the French "pensée" the meaning of which is alluded to by Shakespeare when he says "There's Pansies that's for thought."

VIOLA WIGHTIANA (Wall.) stoloniferous, slightly hairy: leaves cordate-ovate, crenated: sepals lanceolate: somewhat acute; spur short, very blunt: torus flattish: style attenuated downwards, stigma rostrate, convex but not hooked, neither margined nor papillose: fruit globose.—*W. and A. Prod, page* 32.

A humble plant common on the Neilgherries, flowering at all seasons. In general appearance as well as in Botanical characters very nearly allied to *V. odorata* but at once, in the growing plant, distinguished by its being destitute of its sweet scent.

VIII.—DROSERCEÆ.—SUN DEW TRIBE.

This is a small but curious order, the species usually frequenting moist swampy ground, but this is not constant as one of the Neilgherry species (*Drosera peltata*) is frequently found on the dry slopes of the hills, but then only during the rainy season showing that this departure from the character of the family is but partial.

Viewed as a whole, this family may well be called cosmopolite, as they are found in nearly all countries and climates. This peculiarity of extensive distribution is not unfrequent among aquatic and marsh plants and is well exemplified in the accompanying species of *Drosera*, which I have gathered on the banks of the Adyar at Madras, and in the most elevated marshes of the Neilgherries, fully 8,000 feet above the sea. The Parnassias, on the other hand, are more tenarious of a cool climate, not one having hitherto been found in Southern India on a lower level than the table land of Mysore. The one here figured I have only met with on the Neilgherries, and there only in the swamps and bogs of the higher ranges, as about Ootacamund, where it is not unfrequent during the rainy season.

As in the case of *Flacourtianeæ* much difference exists among Botanists as to the place *Droseraceæ* should occupy in the natural series and whether *Drosera* and *Parnassia* should be united in the same order, my own impression is in favour of retaining them as now placed, which is certainly sufficiently in accordance with what is called technical characters, though it is not improbable that, when more deeply and skilfully scrutinized with the aid of a good microscope, differences of structure might be discovered, demanding the separation of the two suborders, of which it is now made up, and their elevation to the rank of distinct orders.

The Droseras are all remarkable on account of their Fern like vernation, that is, the leaves are rolled up in the bud like the mainspring of a watch and gradually unroll as they grow, they are further remarkable on account of the glandular hairs with which their leaves are furnished, which secretes the viscid juice or dew with which each is tipped, and has procured for them the English name of Sundew. In this dew insects which happen to settle on them are entangled, while the leaves contract and retain them. One species (*Dionæa muscicapa*) familiarly known by the name of Venus' fly trap, possesses the property of irritability in a very remarkable degree. It has two-lobed leaves, the margins of which are set round with bristles and a few scattered on the surface. The moment a fly or any other insect that may have settled on the leaf touches these middle hairs, the lobes instantly contract on the intruder and remain contracted so long as it lives and excites, by its struggles to get away, the irritability of the leaf. It appears from the experiments of Mr. Knight of Chelsea, that the plant in some way derives nourishment from the insects so caught.

DROSEREA.—*Sun Dew.*

Sepals 5, persistent, equal: æstivation, imbricative. Petals 5, hypogynous. Stamens hypogynous, distinct, withering, five and alternate with the petals or ten; anthers bilocular, bursting longitudinally. Ovary one: styles 3-5, slightly connected at the base or distinct, bifid or branched. Capsule 3-5-valved, oculicide, 1-celled, or spuriously 3-celled, the dissepiments being formed by the placentas meeting in the axis. Seeds without an arillus: testa sometimes loose and distinct from the tegmen. Embryo straight erect, in the axis of a fleshy or cartilaginous albumen.—Leaves alternate, furnished with glandular hairs, with a circinate vernation. Stipules in the form of cilia at the base of the petioles.—*W. and A. Prod.*

Of this genus there are now above 60 species described, but none of them possessing much interest except to the Botanist as they are generally inconspicuous plants of difficult cultivation, if indeed they can be cultivated at all. D. peltata. One of the two species found on the Hills is also a native of New Holland. The one figured is very common in the swampy grounds about Ootacamund, but requires to be looked for as it is generally concealed by the herbage among which it grows.

DROSERA BURMANNI (*Vahl:*) stemless: leaves all radical, obovate-cuneate, sessile, veins reticulated; scapes erect, and the calyx glabrous: seed-coat not arilliform.—*W. and A. Prod. p.* 34.

A low growing stemless plant, inhabiting swampy ground. On the hills it is usually to be met with in flower at all seasons, but in greatest perfection during the summer months. The clump of plants represented were selected to show the manner of its growth, but unfortunately were unavoidably not taken at the best season, and do no ttherefore show it to the best advantage, though it conveys a good idea of its habit as seen growing.

PARNASSIA.—*Grass of Parnassus.*

Stamens 10; 5 fertile; 5 sterile, opposite the claws of the petals. Stigmata 3-4 sessile. Capsule 4-valved.—Quite glabrous, herbaceous, bog plants. Leaves radical, petioled. Scape with one sessile foliaceous bractea or rarely naked, dilated immediately under the flower.—*W. and A. Prod.*

The European *Parnassia palustris* is supposed to be the plant referred to by Dioscorides as the grass of Parnassus, hence the name has been retained for the genus which now includes about 12 species, five of which are natives of India. Dr. Zinker has published a figure of this plant under the name of *P. Schmidelii* in his figures of Indian plants, not being aware at the time that it had been already described.

The genus is readily recognised by the yellow glandular bodies situated between the stamens, and by sessile the floral leaf situated on the middle of the flower stalk.

PARNASSIA WIGHTIANA (Wall.) leaves broadly cordate-ovate or slightly reniform; sinus slightly rounded: bractea like the leaves, embracing the scape: petals obovate-oblong, their lower half having the margin cut into numerous slender linear simple or forked segments resembling a fringe; ungois very short, broads and cuneate: sterile stamens about as long as the fertile, cleft upwards into 3-5 stout horn-like segments that are glandular at the point. —*W. and A. Prod. p.* 35.

A low growing herbaceous plant, abounding in almost every swamp which, during the rainy season they ornament with their numerous rather showy flowers, in general appearance somewhat resembling Butter cups but differing in having the flowers pure white in place of yellow, the prevailing colour of Ranunculus. In *Parnassia palustris* there are four stigmas and 4 lines of seed within the ovary, in this there are only three, this, independent of other marks, affording a certain and easily observed distinction between these otherwise very nearly allied species.

IX.—POLYGALEÆ MILK-WORT TRIBE.

This is a large and rapidly increasing family; within the last 20 years the number of its species has been nearly doubled: like the preceding it is truly cosmopolite in its distribution, species in some form being met with in all climates. Of the increase, the genus

Polygala has had a large share. When DeCandolle published the first volume of his Prodromus in 1824, he described 164 species, 30 of which were imperfectly known. In 1842 Walpers, in his supplement to that work, enumerates 120, only twelve of which had been referred to in the original work.

This order is as universal in the forms it assumes as in its distribution, for here we find the minute *Salomonia* not three inches high, and the umbrageous *Xanthochymus*, a good sized tree, besides many large shrubs. Among the Polygala's proper, in like manner, we have some not exceeding a few inches, and rising thence step by step through all grades to the *P. arillata*, here figured, which I have seen in the sheltered woods of the Neilgherries nearly 20 feet high. The Indian Polygalas except the last are for the most part small, having little beauty to recommend them to the notice of the florist, many of those from the Cape are, on the contrary, most showy, and are found in many of the Hill gardens under the name of CapeBroom and such like misnomers. One of the finest has large Lilac coloured flowers. The one here figured might, I think, be advantageously added to the short list of cultivated species.

A few species only of this order have been made available to human wants. The snake root (*Polygala* Senega) of America and the *Polygala crotalarioides* of the Himalays have both got the credit, among the natives of their respective countries, of being an antidote to the poison of the snakes. Most of the species are bitter and probably, more or less laxative as is the case with *P. amara* which was formerly occasionally used in medicine but is now held in small repute.

POLYGALA.—*Milk wort.*

Sepals 5, persistent, the *alæ* large and petaloid. Petals 3; their claws all united with the staminiferous tube, the lower one (*carina*) keel-shaped, the two additional ones abortive. Stamens united into a tube at the base, which is cleft in front: anthers opening by a pore. Ovarium 2-celled; ovules solitary, pendulous from the apex of the cell. Capsule 2-locular, loculicide, compressed. Seeds pendulous from the apex of the cells, pubescent, with a carunculate arillus at the hilum: albumen abundant, fleshy.—Shrubs or herbaceous plants. Flowers arranged in terminal or axillary racemes.—*W. and A. Prod.*

This genus though, so abounding in species that, I believe, not fewer than 300 are to be found in European Herbaria, demands but a brief notice here. It includes probably upwards of 30 Indian species nearly all of which except *P. arillata* are annuals or small herbaceous perennials without either beauty or properties to recommend them to notice—several are found on the hills, some procumbent and so hid among the grass that Botanic eyes are required to detect them, two or three others are annual, appearing during the rains among the long grass and about the borders of corn fields. The flowers of all these are small, varying in colour, yellow, pale pink or approaching to lilac.

POLYGALA ARILLATA (Ham.) shrubby, branches pubescent; leaves oblong, acuminated, on longish petioles, puberulous beneath; racemes lax, many-flowered, terminal or opposite to the leaves and about as long, drooping; bracteoles caducous: alæ obovate, obtuse, tapering downwards, glabrous: carina cristate: capsule reniform, retuse, coriaceous: seeds globose, smaller than the large carunculus.—*W. and A. Prod.* p. 39.

A handsome ramous leafy shrub, varying from 6 to 12 and even in favourable situations, 20 feet high, found growing in shady woods usually near water. Flowers yellow racemose, racemes erect or scarcely drooping; seeds enclosed in a large scarlet carunculus, leaves deep green from 4 to 6 inches long, and about 2 broad, acuminated, strongly netved, glabrous or slightly puberulous beneath.

X.—CARYOPHYLLACEÆ.—Chickweed Tribe.

To this family belong, alike the beautiful and much admired Pinks, Carnations, Piccotees, Sweet-williams,Catch flies and Corn-cockles and the almost inconspicuous flowered Starworts and Chick-weeds. In the former division there are no indigenous species found on the hills, and only three or four of the latter. The one here represented, which is a true native, is introduced rather to show the contrast, as compared with the gay pinks,the aristocratic members of this Natural family, than for any beauty of its own. Such being the case, it is unnecessary to dwell long on this order. Of the first division (*Sileneæ*) several are cultivated in our gardens such as *Dianthus* including carnation, sweet-william, &c., *Silene* or catch-fly and *Argostemma*, or corn-cockle : of the second (*Alsineæ*) several are sufficiently abundant as weeds, among which may be mentioned the *Cerastium* or chick weed and *Stellaria* or starwort, the *Arenaria* or sandwort, here figured, rarely met with about gardens but is abundant on the road side leading to Dodabet, and other equally retired situations.

The bulk of the family is extra-tropical, it therefore seems rather curious that the Neilgherries should have only one representative that they can undisputedly claim as their own. All the others being European plants and probably introduced.

ARENARIA.—*Sandwort.*

Sepals 5. Petals 5, entire. Stamens 10 (or fewer by abortion). Styles 2, 3 or 4. Capsule opening by 3, usually bipartite, valves. Seeds numerous, roundish, small. Stipules none.

The plants of this genus are generally mere weeds, usually growing in sandy soil,very diffuse, spreading extensively, or if growing among bushes climbing among their branches to a considerable height such is the habit of our plant.

Arenaria Neilgherrensis (W & A.:) stems elongated, much branched, procumbent, with an alternate line of hairs on one side : leaves distant, ovate, mucronulate, glabrous, with minute whitish points, 1-nerved ; margins thickened, nerve-like, ciliated towards the petiole : flowers axillary, or in terminal sub-dichotomous panicles : pedicels viscidly pubescent all round,longish, slender ; s-pals oblong, acute, with 1 dorsal hairy nerve ; margin membranaceous ; petals longer than the calyx : styles usually 3 (sometimes 2 or 4) : capsules ovate, nearly the length of the calyx.—*W. and A. Prod. p.* 43.

XI.—MALVACEÆ.—Mallow Tribe.

This is a large, and in its relations to man, a most important family as supplying him with food and clothing and medicine. Within the tropics, where they abound, several species, are cultivated for the first, such as *Hibiscus esculentus, canabinus* &c. ; cotton, one of the products of this family, is employed as clothing in every part of the globe ; while sundry species of mallow, sida &c., are in request in domestic medicine as emollients, demulcents, and for fomentations in all sorts of ailments,requiring such remedies. Though many of them rejoice in handsome flowers, a few only have found their way into the flower garden, among these may be mentioned the splendid Hollyhock (*Althæa rosea*) the Tree mallows (*Malope trifida* and *malacoides* and *Lavatera arborea*) the Shoeflower and changeable rose Hibiscus. (*Hibiscus Rosa Sinensis* and *mutabilis*). Of these the Hollyhock and Malope, and occasionally a large species of Mallow, perhaps *Malva sylvestris*, find a place in the Hill gardens.

The species of this order found on the hills are not numerous, and most of those I have observed are also found on the plains. This might be expected as the bulk of them are of tropical origin. It is not improbable, however, when more carefully investigated, that they may prove more numerous than I at present suspect, for I must plead guilty to the negligence of having bestowed less attention on this tribe than I might and ought to have done, in the course of my occasional visits to the hills. Had it been otherwise, it is my belief, I might have found more than two undisputed Neilgherry species with which to illustrate the family. One of these, the Mallow, belongs to an extra-tropical family, the other to a tropical one, having several representations on the plains of India, the best known of which is the Bandy-kai (*Abilmoschus esculentus*) the glutinous fruit and round pea like seed of which is esteemed by many and considered by most people a wholesome vegetable.

The very nearly allied orders *Bombaceæ* and *Lythriaceæ* I have not met with on the table land, if it may be so called, of the hills, and have not in consequence introduced them here, but several species are found on both the Eastern and Western slopes, shall as *Bombax, eriodendron,* two species of *Kydia,* a species of *Microchlæna* and some others. I may however remark that further consideration leads me to suspect the species of *Kydia* I published under the name of *K. calycina* (Icones No. 879) is distinct from Roxburgh's plant, though identical with the species described in our prodromus under that name, which circumstance misled me while putting the name to the drawing. The smaller flowers and involucral leaves of my plant give rise to this suspicion, which, however, I refrain from acting on until I shall have had an opportunity of comparing specimens of both trees.

MALVA.—*Mallow*

Calyx 5-cleft, persistent, surrounded by an involucel of usually 3, rarely 1-2 or 5-6, more or less oblong or setaceous bracteoles. Ovarium with many cells, each with one ovule. Styles as many as the cells. Carpels several (rarely only 5), capsular, indehiscent, 1-seeded, circularly arranged round the axis. Radicle inferior.—*W. and A. Prod.*

This extensive and very natural genus, including upwards of 100 species, is found scattered over the whole globe, but most abundant in the warmer regions of Europe and about the Cape of good Hope. The species are herbaceous, shrubby or, though rarely, small trees with alternate petioled leaves, usually angled or lobed, occasionally digitately lobed, and axillary flowers. The flowers vary in colour and the colours are so constant that the species have been grouped and distinguished according to that circumstances,a proceeding rare in Botany, owing to the constantly observed tendency of colours of flowers to vary in different plants of the same species, and even in different flowers of the same plant.

Malva Neilgherrensis (R. W.) annual hairy all over; branches diffuse somewhat angular: leaves long petioled suborbicular cordate, 5 lobed; lobes ovate obtuse doubly serrated: flowers numerous,densely aggregated in the axils of the leaves: involucel of three narrow linear lanceolate acute leaflets, shorter than the calyx: calyx somewhat inflated 5 cliff, lobes ovate acute 3 nerved: corolla rose coloured, nearly twice the length of the calyx, petals deeply emarginate, carpels about 10, corrugated on the angles, pubescent.

Kottergherry in cornfields and about villages, in the rich soil surrounding the latter very luxuriant: flowering during the rainy season. The larger leaves are from four to six inches across, pubescent above hairy beneath, supported on a hairy petiol from four to six inches long. Flowers very numerous, small in proportion to the size of the plant, forming dense clusters, or short racemes in the axils of the leaves. Involucral leaves slender clothed with long hairs, acute, calyx considerably inflated,cleft about half way down, hairy, lobes ovate obtuse three nerved and, viewed by transmitted light,finely reticulated between; after drying translucent and chartaceous: capsule white,triangular,corrugated along the exterior angles, pubescent. These last points are not shown in the drawing, the figures having been taken from too young specimens.

This species, comes nearest to *M. verticillata* a Chinese plant, but, so far as can be made out from written characters seems amply distinct.

ABELMOSCHUS.—*Bandikai.*

Calyx 5-toothed, spathaceous, deciduous, surrounded by a 5-10-leaved often very caducous involucel. Ovarium 5-celled; cells with many ovules. Style 1, 5-cleft at the apex. Stigmas 5. Capsule 5-celled, 5-valved, loculicidal, polyspermous. Seeds naked.—*W. and A. Prod.*

The few plants of this genus, known to De Candolle, were included by him in the genus *Hibiscus* but referred, along with many other true species of Hibiscus, to his Section *Abelmoschus*. Subsequent authors have not adopted this arrangement. The genus was originally proposed by M. Medicus in 1787 a treatise on *Malvaceæ*: reduced by D.C. in 1824, and again revived by Dr. Wallich in the letter text of his splendid Plant. Asiaticæ Rariones with reference to a very handsome species figured by him in that work under the name of *Bamia*, (on the plate) a M.s.s. name of Mr. Brown, (in the Banksean Herbarium) whose authority leaves no doubt as to the future stability of the genus.

It now includes upwards of 30 species from India, the Eastern Islands, Cape of Good Hope, New Holland and South America. They are for the most part prickly annuals or biennials, rarely shrubs with alternate bistipulate petioled, entire or palmately lobed, serrated leaves: axillary, solitary, one-flowered peduncles and large, usually, yellow flowers.

The plant here figured was some years ago published by Dr. Zenker in his Indian plants under the name of *Hymenocalyx*, in allusion I suppose to its delicately membranous calyx, which lies concealed within the large rough foliacious involucel, until artificially brought to light, owing to the latter splitting, spath-like, along one side only. This structure is so different from what we find in the other species of *Abelmoschus*, that reconsideration inclines me somewhat to recede from an opinion I formerly expressed in regard to the unsuitableness of separating this as a distinct genus. It certainly sufficiently accords with *Abelmoschus* in most other points, which is adverse to its complete separation, but at the same time, it occurs to me, so great a difference ought to be marked by making it the type of a section or subgenus. Walpers in his Repertorium Botanicum, apparently influenced by similar views, has referred our *Lebritonia procumbens* to *Pavonia* from which it only differs in having a foliaceous 5-leaved involucrem in place of one having from 5 to 15 filiform or subulate leaflets. For these reasons I here correct our former error, by raising this plant to the rank of a subgenus, and making it the type of a section, distinguished by having a spathaceous involucrum enclosing the calyx and tube of the corolla. The involucrum is composed of from 3 to 5 cohering leaves, the flower dissected by the Draftsman seems to have had four, as that is the number shown in the plate. The membranaceous sepals cohere like the leaves of the involucrum and burst irregularly.

Abelmoschus (Hymenocalyx) angulosus (Wall:) stems herbaceous, not prickly: leaves on long petioles, cordate, 5-lobed, unequally toothed; lobes ovate acuminated; upper side pubescent with short softish hairs, under slightly tomentose: pedicels rigidly and horizontally hairy, about as long as the petioles: involucel 3-5 leaved, leaves cohering splitting spath-like: calyx much shorter, and concealed within the involucel, membranaceous: capsule ovoid, acute, very hispid.—*W. and A. Prod. P. 88.*

This is a considerable, erect growing, shrub, frequent in moist soil in clumps of Jungle on the Neilgherries: in favourable situations, as on the banks of streams, attaining the height of from 10 to 15 feet. It is to be met with in flower at all seasons, but perhaps in greatest perfection during the earlier months of the year, contrary to the general character of the genus the flowers are white or very pale yellowish.

I have altered that part of our specific character which refers to the involucel and calyx which, as given in the Prodromus, is incorrect.

XII.—ELÆOCARPEÆ.

Botanists differ in opinion as to the propriety of keeping up this order distinct from *Tilliaceæ* to which, if distinct, it is assuredly very nearly allied, so near indeed, that I feel disposed to adopt Endlicher's views in considering it a suborder of *Tilliaceæ* from which it mainly differs in having fimbriated petals, and in the stamens opening transversely across the apex in place of longitudinally. Distinctions such as these seem scarcely worthy of the dignity of Science, when unaccompanied by strongly marked natural characters. These certainly, are not wanting in the present instance, but seem scarcely sufficient to enable this tribe to be kept up as a distinct family.

Considered as a distinct order, it is a small one, consisting for the most part of trees remarkable for the number and unassuming beauty of their flowers. Several species are found on the Hills, namely, one very beautiful species of *Elæocarpus*, perhaps two, though of that I am still uncertain, and three, if not four species of *Monocera*, of which the one here represented is incomparably the most beautiful. I never myself met with it in flower until this season, and was particularly struck with its beauty, which cannot be transferred to paper. I found several trees on the bank below Coonoor in full flower in November. Most of the *Elæocarpi* have very hard tuberculated seed, about the size and somewhat the shape of an olive. These the native devotees are in the habit of boring and stringing as beads, which they constantly wear as a sacred appendage round their necks. The fruit of *E. serratus* is eat on the Hills by the natives, as we eat plums, but is a poor substitute.

MONOCERA.

Calyx 5-sepaled. Petals 5, concate, usually silky on the back, 3-5-cleft and much laciniated towards the apex. Stamens numerous (25-30): anther valves unequal; outer one elongated, tapering and subulate, much longer than the inner one. Ovarium surrounded at the base by 5 glands, 2-celled: ovules numerous, in a double row in each cell. Fruit a drupe: nut smoothish or tuberculed, 1 2-celled. Seeds solitary in each cell.—Trees. Leaves lanceolate or cuneate-oblong, serrated or entire.—*W. and A. Prod.*

One species only of this genus was known in the Peninsula when our Prodromus was published in 1834 namely *M. tuberculata*, since then I have found that and three others on the Neilgherries, namely *M. ferruginea*, also described by Dr. Jack as a Malayan tree, *M. glandulifera* Hooker, also found in Ceylon, and the subject of the accompanying figure. The plants composing it were separated from *Elæocarpus* principally on account of their long bristle pointed anthers, those of *Elæocarpus* being broad pointed and rounded at the apex, occasionally, ornamented with a few hairs. The distinction does not seem to be a good one, being much too slight for plants in all other respects so nearly allied. As a section or subgenus it would have been most useful for dividing a large genus, but I do not think it merits the value, as a generic character, which has been assigned. The genus has, however, been preserved by the latest writers, Endlicher and Meisner; I therefore, in deference to their authority, relinquished my original intention of reducing it to the rank of a subgenus and calling the plant here figured *Elæocarpus* (*Monocera*) *Munroii* which would, I think, have been the more appropriate nomenclature.

Monocera Munroii (*R. W. Ill. Ind. Bot.*) glabrous, leaves ovate lanceolate, acuminated slightly serrulate on the margin, without glands on the under surface: racemes about the length of the leaves many flowered, flowers drooping: sepals lanceolate acute: petals not involute on the margins: anthers glabrous; apex, at length reflexed, ovary elevated on the torus very hairy: fruit about the size of an olive. —R. W.

On the slopes of the large ravine below Coonoor flowering in November and December, covered with fruit in February, apparently nearly full grown. A large and handsome tree, which I should estimate at not less than from 50 to 60 feet in height, with a fine umbrageous head, every branch of which, when I gathered the specimen here represented, was covered, like it, with pure white flowers, forming a rich contrast to the deep green foliage. Captain Munro first found it in Coorg and sent me the specimens from which the above character was taken. It is certainly very closely allied to *M. glandulifera*, but differs in technical characters, and as I have never seen that tree in such a state as to admit of their accurate comparison, I am still uncertain whether or not they ought to be united.

XIII.—TERNSTROEMIACEÆ.

This interesting family of beautiful flowering trees and shrubs is principally remarkable on account of its including the far famed Tea and Camellia shrubs: the leaves of

the former being celebrated for their peculiar properties and the flowers of the other for their exceeding beauty, which obtains for them a place in almost every European green house. The two species here figured might, by careful cultivation, be almost made to compete with these in beauty, were it not for their great size, which disqualifies them for house culture, and they are too tender to stand a European winter, however well they might bear the summer temperature of Europe. Two other species, *Chochlospermum gossipium* and *Eurya Wightiana*, of this family are also found on the hills, and the latter so generally diffused, that I have met with it in almost every clump of Jungle from about 5,000 feet of elevation up, to the top of Dodabet. The aspect of this differs somewhat according to the situations it occupies; when found in woods, where it enjoys both shelter and rich soil, it attains the size of a considerable tree with long lanceolate leaves; in open ground it has a stunted shrubby appearance with shorter somewhat obvate leaves. These differences lead Arnott and myself to consider them distinct species, which a more intimate acquaintance with all their forms in a growing state does not confirm.

The plants of this family are extensively distributed, being found in Asia, Tropical America, and, more sparingly, in Africa, probably owing to the flora of the last being less known than those of the other two. They seem, however, most abundant in the Phillippine Islands. When the first volume of De Candolle's Prodromus was published in 1824, sixty-two species only were known, since then the number has been increased to about 200, a large proportion of which are from the Phillippine Islands, but many also from Tropical America and Brazil.

The long agitated question as to the origin of green and black Tea has, I believe, been at length settled by the experience of the Assam Tea Company, proving that they are the produce of the same plant differently prepared. A new question has, however, arisen, which threatens for a time to engage the attention of Botanists, namely, whether the Chinese and Assam Tea plants are the same or different species. This is a question which one might suppose could be readily answered, but judging from occasional passing remarks I have seen in scientific periodical publications, it would appear otherwise. This, however, is a point on the discussion of which, I am not prepared to enter, as it would require for its thorough investigation, not merely perfect specimens of both plants but also an aquaintance with them as seen both under cultivation and in the wild state. Judging à priori, and without these data, I should infer they were the same originally, but that, under a long course of cultivation the Chinese one has at length become so altered in appearance that it can no longer be recognised as the same thing, much in the same way as we find the crab become the golden pippin: or, as we find the large leaves of luxuriant mulberries dwindle into small ones under the operation of daily picking.

It is a curious fact, ascertained through the investigations of modern Chemistry, that the peculiar vegetable principle from which Tea, Coffee, Coco and Paraguay Tea derive their nutricious properties is nearly the same in all, and characterized by the large pro-

portion of azote which it contains. In the Chinese and Paraguay tea, it is quite identical and has been called *Theine* from *Thea*, the Botanical name of Tea; that of Coffee and Coco being slightly different, has been respectively called Coffeine and Theobromine, *Theobroma cacao* being the name of the latter. These chemical investigations have further led to the discovery that the fatty deposits of animal bodies contain a large proportion of Azote and that azotized food is necessary for its production: hence it is justly inferred that these beverages are all endowed with nutritious properties to an extent far beyond what, previous to these discoveries, they were supposed to possess.

Botanically considered, the Tea and Camellia are esteemed species of the same genus In like manner Paraguay Tea and the common Holly are species of the same genus, but chemical analysis has not discovered *Theine* in either Camellia or Holly, a fact that will perhaps lead Botanists to reconsider the Botanical characters of these genera before finally uniting, the former with *Thea* or the latter with *Ilex*.

It is said that a species of *Eurya* is used in Ceylon as tea. There are two species of *Ilex* on the Hills, one, of these *Ilex dentata* is very nearly allied to the *Ilex Paraguayensis*, it might, therefore, be interesting to have the leaves of both our *Eurya* and *Ilex* analysed to ascertain whether either might be used as a substitute for the Chinese leaf.

CLEYERA.

Calyx of 5 sepals, with 2 bracteoles at the base. Petals 5, distinct, with a broad base, alternate with the sepals: æstivation imbricated. Stamens distinct, adhering to the base of the petals: anthers adnate, linear, dehiscing longitudinally. Style single, crowned by 2-3 stigmas. Fruit baccate, 2 3-celled. Seeds 2 in each cell, pendulous from the summit of the axis, wingless: albumen fleshy: embryo curved.—Evergreen shrubs with axillary pedunculs. Flowers of a moderate size, white or yellowish.—*W. and A. Prod. p.* 86.

Only six species of this genus are yet described, of these one is from China, two Japan, one Japan and Nepaul, one from Ceylon, and lastly, the one here figured from the Neilgherries: another is stated by Dr. Wallich to be a native of Nepaul, but that has not yet been described. The Ceylon one, first described in my Illustrations, seems very closely allied to one of the Japan ones, if not indeed the same. The Neilgherry one is a large tree, extensively distributed over the hills.

As ornamental trees, both this and the following merit being more extensively introduced about our grounds and enclosures, and judging from its frequency, in nearly all situations on the Hills, I should suppose this might easily be accomplished and prove a vast improvement, by displacing the *Cassia tomentosa* which is not to be compared with them in beauty. Those who may think of making the attempt thus to decorate their grounds, should raise the plants from seed, as those removed from the jungle generally die, partly owing to the injury their roots sustain in transplanting, but principally through the rude exposure to which their removal from the shelter and rich moist soil of the forest subjects them, when weakened by being deprived of the greater part of the delicate fibres of their roots, which are as truly the organs of nutrition of plants as the stomach is that of animals. When transplanting is attempted, the rainy season, June and July, should be chosen, and the plants selected for removal the smallest that can be found, so as to admit of their being artificially sheltered from the strong winds which then prevail. This is a general principle in transplanting applicable to all sorts of trees and shrubs.

CLEYERA GYMNANTHERA (W. & A.:) glabrous; leaves cuneate-obovate, obtuse or shortly and obtusely pointed, coriaceous, entire, peduncles twice as long as the petioles, 2-edged: bracteoles persistent: anthers dotted with little points on the connectivum, without bristles.—*W. and A. Prod. p.* 87.

A large tree with bright shining leaves and yellow flowers, flowering in May, June and July, and ripening its fruit in February and March. It is however so generally distributed that it is to be found in flower and fruit at nearly all seasons, varying according to the aspect and shelter it enjoys. The timber is of a red colour, of rather close grain and is by the natives considered strong and durable.

GORDONIA.

Calyx of 5 rounded coriaceous outwardly-silky sepals, with similar external deciduous bracteoles Petals 5, connected together at the base. Stamens numerous: filaments united at the base with the claws of the petals (and hence monadelphous or somewhat 5-adelphous, according to the degree of union among the claws of the petals): anthers ovate, oscillatory. Styles combined to the apex, crowned with a peltate 4-5 lobed stigma. Capsules 4-5-celled, 4-5-valved, loculicidal. Seeds 2-4 in each cell, attached to the central column, terminated by a leafy wing: albumen none: embryo straight radicle, oblong: cotyledons foliaceous, wrinkled and plated lengthwise.—Trees or shrubs, with the appearance of *Camellia* or *Thea*. Pedunoles axillary, 1-flowered.—*W. and A. Prod. p.* 87.

Though the number of species of this genus be small, they are widely distributed, Virginia, Carolina, Jamaica, Nepaul, Ceylon, and the Peninsula have each one or more species. They are all trees or large shrubs with handsome camellia like flowers. All the Indian species, that I have seen are trees, and the one here figured often attains a large size.

GORDONIA OBTUSA (Wall.:) leaves cuneate-oblong, obtuse or with a blunt acumination, with shallow serratures, glabrous: peduncles short, not so long as the petioles: petals obcordate, slightly united at the base: stamens somewhat pentadelphous.—*W. and A. Prod.*

A pretty large tree, widely distributed over the Hills, found in Jungles, on every part of them I have yet visited; flowering during the rainy season, and ripening its fruit during the months of March and April.

XIV.—OLACINEÆ.

This is a small family of trees and shrubs, but extensively distributed, as it species are found more or less abundantly in every tropical country. In regard to its relations to the other dicotyledonous families, considerable difference prevails among Botanists. Mirbel, who first established it as a distinct order, placed it among the polypetalous tribes, in the position it here occupies, near *Aurantiaceæ*. Brown had previously placed *Olax*, the type of the order, as an allied genus at the end of *Santalaceæ*, but differing from true Santalaceous plants in having both a Calyx and Corolla, and a superior or free ovary similar to that shown in both *Gomphandra* and *Stemonurus* while that of *Santalaceæ* is inferior or adherent to the tube of the Calyx as seen in the accompanying figure of *Bursinopetalum*. Nearly all writers subsequent to Mirbel have followed his arrangement. Mr. Bentham in an admirable Memoir published in 1841, in the Linnean Transactions, coincides in the view taken by Mr. Brown, a view which is greatly strengthened by my new genus as well as by Alphonse De Candolle's new genus *Hyphocarpus*, which has a similar structure; for myself, I now feel quite satisfied that the proper station for this order is beside *Santalaceæ* and *Daphnoideæ* in Endlicher's class *Thymalaeæ*; nor do I apprehend the double floral envelope can offer any solid objection to this arrangement, since the glands inserted on the throat of the calyx of *Santalum, Daphne, Gnidia*, &c., and the calyculus of *Choriarum* may all be adduced as instances of analogous structure, while in the much more important matter of structure of the ovary, ovulum, and seed, the *Olacineæ* closely associate with these orders, and have scarcely any analogy with the orders among which Mirbel and others have placed them. The same remark applies to *Loranthaceæ* which is truly a *Thymalæous* family,

The plants of this order, though interesting in a Botanical point of view, have little to recommend them to the favour of the amateur. *Stemonrus*, when in full flower, is

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somewhat ornamental at a distance but the fetor exhaled by the flowers does not encourage a closer acquaintance. *Bursinopetalum* is certainly a very fine tree, as seen growing in its native jungles in the humid climate of Sispara, but I am doubtful whether, if transferred to other situations, it would realize the expectations of the planter.

GOMPHANDRA.—*Wall.*

Flowers unisexual, by abortion, calyx small, not enlarging in the fruit. Petals 4 or 5 cohering at the base. Stamens all fertile as many as the petals alternate with them; filaments clavate; anthers innate. Ovary free, 1-celled with 2 ovules pendulous from the apex, stigma sessile, lobed. Fruit drupaceous, one-seeded, embryo small in the apex, of a copious albumen, radicle next the hilum.

Large rambling shrubs, inflorescence axillary cymose, flowers numerous in the male, about 3 in the female.

In the rudimentary ovary of the male, traces of two ovules are seen, and the female flowers are furnished with sterile stamens, the anthers of which are hairy, while those of the male are nearly glabrous.

GOMPHANDRA POLYMORPHA. (R. W.) dioecious glabrous, leaves petioled, membranaceous, glaucous beneath, from oblong to obovate lanceolate acuminated: cymes axillary solitary or in pairs, about the length of the petiol; male, many flowered, female 2 or 3 flowered: calyx entire, minutely 4 or 5 toothed: petals 4 or 5 united below, glabrous: stamens projecting: fruit oblong, crowned with the persistent stigma.

This large shrub is found in the dense clumps of jungle about Coonoor, the Avalanche and elsewhere, flowering in March and April, and, usually, the female, at the same time bearing ripe seed, showing that it is in flower most part of the year. The plant here figured approaches most nearly to my variety *G. angustifolia.* Ill. Ind. Bot. p. 103, but does not seem quite identical. I cannot, however, find characters to distinguish it as a species. It seems rather to be an intermediate form between that variety and *G. coriacea*, differing from the latter in being pentandrous, not tetrandrous, but in other respects, agreeing, upon the whole, better with *coriacea* than *polymorpha.*

STEMONURUS.—*Blume.*

Flowers bisexual or dioecious, by abortion, corolla 5, rarely 6, petaled cohering at the base. Stamens 5, rarely 6, hypogynous; anthers introrse two-celled. Ovary free, one-celled; ovules 2 pendulous. Stigma obtuse. Drupe one seeded: embryo foliaceous, immersed in the apex of a fleshy albumen, radicle superior.

Trees or shrubs; leaves alternate entire; flowers axillary small, spicate, cymose, or panicled The genus *Stemonurus* is so imperfectly known that Endlicher has placed it and the preceding, with several others, at the end of the order as "genera 'penitus dubea" and from some differences in the character as given by him, which, however, do not appear essential, it is not improbable our species may yet be separated to form the type of a distinct genus. Agreeing, however, as it does, in so many important particulars, with the character as drawn by the founder of the genus, I do not feel myself at liberty to constitute a new one while unacquainted with every other species. The other species of the genus, four in number, are all from Java, while this one seems confined to the Indian peninsula and Ceylon, but is apparently extensively distributed in both, as I have specimens from various stations of both countries. On the Neilgherries it is very abundant and remarkable on account of the extreme carrion-like fetor of its flowers, which often during bright sunshine indicate its proximity when the tree itself is concealed, by others, from the sight.

STEMONURUS FŒTIDUS (R. W.) leaves elliptic oblong acuminated venous, pubescent beneath flowers terminal, small: cymose-panicled every where clothed with short hairs: stamens glabrous: style about the length of the ovary: drupe succulent olive-shaped, purple when ripe, nut thin.

Neilgherries in woods, and thickets: flowering during the rainy season, but may generally be met with in both flower and fruit

This, when growing in favourable situations, becomes a large umbrageous tree; the leaves are of a deep green colour, and when young marked with prominent veins to an extent far beyond what the draftsman has here represented. From what cause, I am unable to state, the flowers are often all males, for a long time I had specimens of this tree in my herbarium before I got them in sufficient perfection to enable me to make out its genus; the leaves vary greatly in size, I have seen them upwards of seven inches long and three broad, but the usual size is from 4 to 6 by about 2 broad. The flowers are very numerous small, yellow, clothed with short hairs both outside and in, and during the heat of the day exhaling the most abominable smell of carrion. The fruit is about the size and shape of an olive, pulpy when ripe, and the stone so thin and soft that it can be easily cut with a knife.

BURSINOPETALUM.—*R. W.*

Flowers bisexual superior. Calyx 5-toothed. Petals five, furnished at the apex with an inflexe bidentate process, estivation valvate. Stamens 5, anthers 2-celled introrse. Ovary adherent, one-celled, with a single ovule pendulous from near the apex. Drupe ovoid umbilicate, one-celled, one-seeded, endocarp deeply inflexed so as nearly to divide the cell into two compartments. Embryo small, eccentric, immersed in the apex of the fleshy albumen; radical very long superior.

A large umbrageous tree with very dark green, almost purplish foliage: leaves alternate, long petioled, oblong elliptical, acuminated at both ends, from two to three inches long by about one and half broad; glabrous coriacious. Flowers, terminal cymosely panicled, small in proportion to the tree, calyx conical, pubering to the ovary, limb short, cup-shaped 5-toothed: petals five, ovate pointed, very coriaceous (whence the name, leathery petals) each furnished within at the point with a little bidentate hook. Stamens five alternate with the petals, filaments short compressed, anthers large, cordate ovate, obtuse two-celled introrse attached near the base. Ovary enclosed within the tube of the calyx and adherent, covered by a thick fleshy disk: style short: stigma obtuse. Fruit drupaceous, about the size of a small plumb, ovoid, the apex-ed by a broad scar where the flower had separated. Putamen hard, deeply inflexed on one side. Embryo small, eccentric, immersed near the apex of a copious fleshy albumen, the radicle, very long, in proportion to the cotyledons, pointing towards the hilum or apex of the seed.

This genus differs from all the rest of the order in its peculiar seed, and from each by many characters. It will form with Alph. DeCandolle's genus, *Hypocarpus*, a new section of the order distinguished by their inferior ovary.

BURSINOPETALUM ARBOREUM (R. W.)

On the slopes of the hills at Sispara in dense forests flowering in April and May, at the same time bearing ripe fruit. In February, when coming into leaf and several weeks before the expansion of the flowers, the foliage is of a lively green colour, afterwards it deepens so much as almost to acquire a purplish tint.

XV.—AURANTIACEÆ.—ORANGE TRIBE.

This is a small but beautiful family of tropical evergreen trees and shrubs, found distributed in some of its forms all over the tropics. The two plants here represented are I believe the only species found on the more elevated portions of the Neilgherries. The Lime is found abundantly in what is called the Orange valley near Kottergherry, the Orange on the slopes at a lower elevation. The fruit of both is brought to Ootacamund and sold in the Bazars and both are considered by the natives quite indigenous. Such being the case I ought probably to have distinguished them as distinct species which, apparently, they are, in place of variaties of the same species. The latter course having, however, been adopted in our Prodromus, I thought it better when putting names to the drawings, to leave the matter as there stated, rather than create discrepancies between the two works, the more so, as each variety is so distinguished that the name may be used either specifically or to indicate a well marked variety. Further consideration has since led me to take a different view, and I now think I should have designated the two plants figured as distinct species, under their respective names, *Citrus vulgaris*, and *C. Limetta* (by mistake *Limonum* on the plate which I request the reader kindly to correct). With regard to the first, I still feel some doubt as to its being the true *C. vulgaris*, as the fruit and large leaves partake more of the character of a citron than an orange; but, on the other hand, the leaf stalk

of the citron is not winged, while here it is, which is considered an important character. This, therefore, seems to be an intermediate form, if not, indeed, a distinct species; but the limits between the species of this genus are so imperfectly defined that I could not help hesitating before adding to the difficulties which attend their investigation by adding one to the number, which more extended acquaintance with its forms might afterwards require me to reduce. Towards the base of the Hills several other Aurantiacious plants occur, such as *Limonia, Glychasmis, Murraya* &c. The beautiful and fragrant, but very evanescent flowered, *Murraya paniculata* is even occasionally found at an elevation of nearly 5,000 feet. I am uncertain whether either of these species of citrus would thrive at Ootacamund, but the *C. Limetta* certainly does very well when transferred to the gardens at Kottergherry and forms a most ornamental shrub. The other I have not myself met with in its native place, (the specimens from which the drawing is taken, having been brought in by a native Collector) and cannot speak of its fitness as a garden ornament.

CITRUS.—*Orange Lime* &c.

Flowers usually in a quinary proportion. Calyx urceolate, 3-5-cleft. Petals 5-8. Stamens 20-60: filaments compressed at the base, and there more or less united and polyadelphous: anthers oblong. Ovary many-celled: ovules 4-8 in each cell, one above the other in a double row, pendulous. Style terete. Stigma hemispherical. Fruit baccate, 7-9-celled: cells with several seeds, filled with a fleshy substance composed of numerous irregular pulpy bags or vesicles, which are mere cellular extensions of the sides of the carpels. —Trees or shrubs with axillary solitary spines. Leaves reduced to one terminal leaflet jointed with the apex of the petiole: petiole often winged.

This genus is so universally cultivated and its species so well known under the various names of Shaddock Pumplemose, Orange, Citron, Lemon and Lime, that any remarks on its habits and peculiarities seem quite unnecessary here.

CITRUS VULGARIS (*Risso*). Leaves elliptical acute or acuminated, slightly toothed: petiol more or less winged, flowers large white: fruit orange-coloured, roundish or slighly elongated or depressed: rind with concave vesicles of oil pulp, acid or bitter.

Neilgherries on the slopes below Kottergherry and Coonoor in the opinion of the Collector quite wild but possibly raised from seed accidentally dropped by travellers.

As above remarked, I am doubtful whether this is the true *C. vulgaris*, some points of the character is at variance with the figure but none of much importance and without better specimens, for comparison, of the true *C. vulgaris* than I possess, I could not venture to found a distinct species on these differences.

CITRUS LIMETTA (*Risso*) leaves oval or oblong often toothed: petiol more or less winged or margined: flowers small white: fruit pale yellow ovoid or roundish, terminated by a knob: rind with concave vesicles of oil: pulp watery acid or sweetish occasionally slightly bitter. Orange valley, near Kottergherry flowering August and September certainly wild. A low, very ramous erect, thorny, bush covered during the flowering season with a profusion of beautiful fragrant white flowers; a very ornamental shrub, well deserving a place in the shrubbery, when judging from what I saw at Kottirgherry, it grows freely.

XVI.—HYPERICINEÆ.—TUTSAN TRIBE.

This is as much an extra-tropical family as the oranges are a tropical one. They abound in Europe and north America, and the Indian ones are all alpine. Five only have yet been found on the Indian peninsula, all of which are natives of the Neilgherries: two

are natives of Mysore but I do not recollect of any below that elevation, and these only on hills there. The *Hypericum Mysorense* is perhaps the most common on the hills and is indeed a very showy plant. The one here delineated is so very rare, that I can only refer to one station, namely, on a swampy plain, known by the grandiloquent name of "New England" near the Devil's Gap above Sisparah, there forming a single clump around two or three stunted trees. In Europe, the species of this genus are found inhabiting mountains and valleys, marshes and dry plains, meadows and heaths, in short are to be met with almost every where, and always conspicuous, especially towards the beginning of autumn, by their large yellow flowers, that being the prevailing colour of the tribe.

In its affinities this order is nearly allied to *Guttiferæ* so nearly indeed that many Botanists unite them and several other families into a class designated *Guttiferæ*, retaining for the old family, so called; that of *Clusiaceæ*. The genus *Xanthochymus* almost unites these two families but is distinct from both, having the flowers of *Hypericineæ* combined with the fruit and seed of *Guttiferæ* or *Clusiaceæ*, that is, the flowers are quinary and stamens fascicled in groups as in *Hypericum*, while the carpels are one-seeded, and the structure of the seed the same as in *Garcinia*. Thus the character of the flower forbids its being associated with *Garcinieæ* while that of the carpel and seed are equally opposed to its union with *Hypericineæ* showing at once, that these two orders are quite distinct, and that it is equally removed from both. For these reasons I should propose that the genus *Xanthochymus* of Roxburgh form the type of a new order to be placed between the other two.

For reasons stated in my Illustrations, vol. I. page 130—31. I still adopt the name *Xanthochymus* in preference to *Stalagmitis*, though opposed by all modern authors, Murray's genus, as defined by him, being a hybrid, without a species to represent it, made up of a series of particulars culled from two quite distinct genera and forming, as a whole, such a combination as never met in any plant that ever grew. His *Stalagmitis gambogioides* the only species being partly *Cambogia Gutta* of Linnæus and partly *Xanthochymus ovalifolius* Roxb. Which of the two is it to be taken as the type of the genus? the one with 4 leaved calyx 4 petals and 4 lobed stigma; or the one with pentadelphous stamens and 3-seeded berries —they can't both go together—if the former is chosen then it has an older name, being *Cambogia* of Linnæus: if the latter, pentadelphous stamens and three-seeded berries does not sufficiently characterize the genus, which has been long ago well defined by Roxburgh and his name generally adopted. One of these names must assuredly be suppressed and in my opinion the hybrid one, without a species to represent it, is the one to go.

I. HYPERICUM—*St. John's Wort-Tutsan.*

Sepals 5, more or less connected at the base. Petals 5. Stamens usually very numerous, united at the base into 3-5 bundles, rarely somewhat distinct. Styles 3-5, distinct or rarely combined, persistent. Capsule unilocular or with several cells. Membranaceous, 3-5 valved, many-seeded. Seeds roundish; seed-coat double; albumen none: embryo with semicylindrical cotyledons.—Herbaceous or shrubby plants. Leaves opposite, or very rarely (in H. *alternifolium*, Vahl, Wall. List. n. 4806) alternate, sessile or nearly so. Flowers either solitary, in threes, cymose, corymbosely panicled, or umbellate, usually yellow.—*W. and A. Prod. p.* 99.

But few of the species of this genus have been admitted into the flower garden, which is the more remarkable as many of them are naturally very handsome, and might, I should suppose, be improved under proper treatment. The *H. Mysorense*, so common on the hills, certainly does form a very ornamental addition to the flower border, even when little care is taken of it, and under skilful treatment might, I think, be greatly improved; so would *H. Hookerianum* if it will thrive in the garden, as its flowers are much finer than those of the other, when seen to advantage, which they are not in the accompanying figure.

HYPERICUM HOOKERIANUM (W. & A.:) glabrous, shrubby, diffuse: stem terete; young branches compressed: leaves opposite, somewhat distant, oblong, obtuse with a mucro, contracted at the base with a kind of very short petiole; lateral nerves arching, and anastomosing; pellucid dots round and oblong, black dots none: flowers (large) clustered at the ends of the branches; sepals roundish-obovate, obtuse, entire, without black dots: petals not dotted: stamens very numerous: styles 5, distinct, overtopping the stamens, shorter than the ovary: stigmas obtuse: capsule 5-celled.—*W. and A. Prod. p.* 98.

Neilgherries in swampy ground, flowering in Feb., and March, a shrub with long slender branches, distichous ovate obtuse leaves, perforated with numerous pellucid points, the branches terminated by clusters of large yellow flowers, which, when they first open are nearly saucer-shaped from the overlapping of the edges of the petals. It is at once distinguished from *H. Mysorense* by the form and direction of the leaves which are distichous in this, and decussate, or crossing and spreading in four directions, in that.

XVII.—GUTTIFERÆ.—MANGOSTEEN TRIBE.

This is a small but very interesting family as being, that from which the Mangosteen (one of the finest fruits in the world) and the Gambage (a substance quite unique in its properties) are obtained. So far as the Indian species are concerned, it is peculiarly tropical in its habits. The *Garcinia* here represented is one of the least so I have yet seen, growing as it does, at an elevation of very nearly, if not fully, 6,000 feet, being found in considerable abundance in the woods about Coonoor.

This family has been divided into four sections, according to characters taken from the fruit, but, to my mind, nothing could be more unnatural than the combination as it now stands in the latest Botanical works. The two first sections are *Clusieæ* and *Monorobeæ*; the first more nearly associated with *Hypericineæ* than true *Guttiferæ*, having polyspermous capsules! as in *Hypericum*, while the latter having quinary flowers and many-seeded berries, approaches *Xanthochymus*; the third section *Garcinieæ* combines *Garcineæ* with *Xanthochymus* and *Pentadesma*, two nearly allied genera, but yet so perfectly distinct from *Garcinia*, that they might be united into a section or even order by themselves, as genera resembling, but not true congeners of *Garcineæ*. *Mammea*, an American genus, seems to associate better; but its leaves have pellucid points as in *Hypericum*, a point of structure not elsewhere found in this family, and therefore demanding further investigation. The fourth section, *Callophylleæ*, is more natural, and associates with true *Guttiferæ* in its quaternary flowers and erect ovules. The whole order, however, requires revision; for, as now constituted, it is undistinguishable from *Hypericineæ* and includes several genera very remotely if at all related.

The two genera here figured belong respectively to the two Indian sections *Garcinieæ* and *Mesueæ* which with *Callophylleæ* form together the proper types of the family, as indicated by the quaternary arrangement of their flowers. The only point, so far as I can learn from written characters, in which they agree with American divisions, is in having opposite shining glabrous leaves Reasoning from the same data only, written characters, I

should suppose *Clusieae* might, without much violence to affinities, be transferred as a sub-order to *Hypericineae*, and *Monorobeae* be associated with *Xanthochymus* and *Pentadesma* and perhaps, *Platonia*, to form a new order.

But leaving these discussions which are scarcely relevant to this work, I may proceed to observe that the genus *Garcinea* for the most part consists of trees, or large shrubs, with opposite glabrous highly polished leaves, with few, usually nearly sessile, yellow flowers in their axils, inhabiting forests, in tracts of country enjoying a warm humid climate. Hence they naturally abound in Malabar, Ceylon, Tenasserim, the Eastern Islands &c., but are almost unknown in the Carnatic, except where, under local circumstances, the above peculiarties of climate are met with—about Courtallum, for example, species of *Garcinea*, *Mesua*, and *Callophyllum* are not unfrequent, and there the *Garcinea Mangostana* or true Mangosteen has been successfully introduced. Two species of the genus Garcinea are known to produce Gamboge; most of the others yield a yellow juice, but not gamboge as it will not mix with water. The *Mesuae* yield very hard wood, hence the Java species has received the name of *M. ferrea* or Iron wood tree, and the beautiful flowered *Callophyllum Inophyllum* also yields a very strong timber, adapted for ship building. There may be other species turned to useful purposes, but these are the principal.

GARCINIA.—*Mangosteen Tribe.*

Flowers monœcious or dioecious. Sepals 4, persistent, without bracteoles. Petals 4, deciduous. MALE.—Stamens numerous, short, inserted on a large fleshy 4-angled or 4-lobed receptacle with or without an imperfect pistillum: anthers 2-celled, bursting longitudinally. FEM.—Staunens 8-30, (always ?) imperfect: filaments distinct, or monadelphous, or 4-adelphous; the fascicles alternate with the petals, without intermediate fleshy glands: anthers destitute of pollen, and usually glandular. Ovary 4-10-celled: ovules solitary in each cell. Style very short, crowned with a large lobed peltate stigma. Fruit fleshy and juicy, indehiscent-4-10-celled, crowned with the permanent style. Seeds solitary in each cell.—Trees.—*W. and A. Prod. p.* 100.

The species of this genus found in the Peninsula are nearly all, except the one here figured and *G. conicarpa*, found on the sea coast, or but little elevated above that level. The subject of this notice I first found on Mr. Lascelles' estate at Halicul, and since then, on the banks of the river at Coonoor; in both places growing in thick jungles close by the stream, some of its roots in the water—since then I have also found it on the Malabar slopes, but at a somewhat lower elevation.

GARCINIA PAPILLA (R. W.) dioecious leaves short petioled, obovate, obtuse: flowers axillary, nearly sessile, aggregated in the staminiferous, solitary or three together in the fructiferous plant: stamens numerous, filaments united, forming a thick short androphore without a sterile style: anthers 2-celled d hiscing longitudinally: ovary globose 8-celled: style a thick short fleshy body, crowned with 8 spreading star-like persistent stigmas, enlarging with the fruit: fruit ovate, oblong, furrowed, 8 or, by abortion 4 or 6 celled, crowned with the greatly enlarged style: seed somewhat triangular, covered with a thin coloured membranous testa.

A diffuse tree growing on banks of streams near Coonoor also in similar situations at Sispurah. Flowering during the rainy months. This species in general appearance is allied to both *G. Roxburghii* and *G. Cambogia* (the *G. Kydia* W. and A. Prod. not Roxb.) but differs from both in the style, the form, and the peculiar nipple-like prolongation of the fruit, whence the name. This last structure seems confined to this plant and to Roxburgh's *G. Kydiana*, a very distinct species, where it exists in a less degree.

MESUA.—*Iron-wood tree.*

Sepals 4, persistent, without bracteoles. Petals 4, alternate with the sepals. Stamens very numerous, slightly connected at the base into a fleshy ring: filaments filiform: anthers erect, 2-celled, bursting longitudinally. Ovary ovate, 2 celled: ovules 2 in each cell. Style longish: stigma peltate

entire. Capsule ovate, acute, 1-celled (by the obliteration of the dissepiment), 2-valved, 1-4-seeded. Cotyledons distinct.—A tree, with a straight slender trunk. Leaves oblong-lanceolate, acuminated, upper side shining, under glaucous: midrib and the margins coloured, lateral nerves close, parallel, almost inconspicuous. Flowers terminal or axillary, large, white. Fruit about the size of a small apple.—*W. & A. Prod. p.* 101.

This genus is purely Asiatic, and is limited, so far as yet known, to 5 or 6 species: figures of three of which I formerly published. They are all handsome trees with large pure white flowers. The one here-figured affords a good idea of what they are, when in full flower. They are handsome growing trees with ascending rather than spreading branches; the leaves of all quite entire, lancet-shaped, perfectly glabrous and, for the most, covered beneath with a thick coating of white bloom. In the parts of the flower they agree with, *Garcinia*, having 4 sepals and four petals, but differ in the ovary, which is 2-celled with two erect ovules in each, in place of 4 or more celled with 1 ovule in each.

Calliphylleæ forms a further descent in that organ, having a one-celled ovary with from one to four ovules, but agrees in the quaternary flowers, 4 and its multiples being constant. Notwithstanding these differences in the ovary, both these tribes seem correctly referred, as sub-orders, to *Guttiferæ*, but taking habit into consideration they cannot be viewed as actual associates, and could not be included in one diagram, in the manner adopted by Dr. Lindlay in his School Botany,* along with true *Garcineæ*.

MESUA SPECIOSA (CHOISY) leaves long linear-lanceolate subacute: flowers shortly peduncled; petals exunguiculate roundish, regular, mature fruit, four-seeded. *Choisy, in D. C. prod.*

This very handsome tree I found on the Eastern slopes of the Neilgherries, 3 miles below Coonoor, probably at an elevation of about 5,000 feet above the sea.

It is not easy to distinguish the species of this genus. I formerly published a figure of the Ceylon plant under the name of *M. ferrea* and up to the present time thought this distinct. A closer examination however leads me to doubt whether the continental one is different from the insular tree, the more so as the original *M. ferrea* is an Eastern tree, while the *M. speciosa* is from Western India. The distinctions between the two as given by Choisy are that in *M. ferrea*, the petals have a claw or 'unguis' which is wanting in this, and that the fruit in that is one-seeded, while in this four is the usual number.

XVIII.—HIPPOCARTIACEÆ,

This, like the former, is for the most part a tropical family, or inhabiting the warmer countries immediately bordering the tropics. The species seem pretty equally divided between South America and Asia predominating, however, in the former. The additions which have been made to the order since its publication in De Candolles' Prodromus, have been principally Asiatic, which have materially tended to equalize the numbers for the two countries. At that time, 1824, the American ones exceeded the Asiatic and African species by more than a half, now they are nearly equal.* It is not to be supposed that a family so tropical in its habits should abound on the Neilgherries, and such experience proves, as the one figured is almost the only species I have found at a considerable elevation. This shrub I found at Sisparah at an elevation of, I think, about 5,000 feet, at a lower elevation two or three others are found, but these come within the tropical range.

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* This I consider one of the most ingenious and, so far as it goes, most useful works now extant on Botany. And no one desirous of becoming thoroughly acquainted with the true working of the natural system should fail to study that Book which may almost be said to present the geometry of Botany, its diagrams being, to the Botanist, of much the same value as those of Euclid are to the Mathematician. The introduction of Diagrams to represent the essential characters of orders I look upon as the first step taken toward reducing Botany to the precision of an exact science, and establishing, on a firm and satisfactory basis, the principles of natural classification; and, therefore, view the publication of this little book as the commencement of a new era in this science. It has only one fault, which doubtless will be remedied in the next edition, namely, there is two little of it, the diagrams being confined to the elucidation of European families, and of these a selection only has been introduced. Now that he has shown the way, it is to be hoped the next edition of the author's Natural System of Botany will be similarly illustrated throughout, and that, ere long, we shall have a genera plantorum in which the limits of both orders and genera are so defined, the mode of doing so being so simple that it might be executed at little cost.

P. S. While this sheet was passing through the Press, I heard from Dr. Lindley himself that an Illustrated edition of his Natural System is in course of publication, and an enlarged edition of his School Botany is already published.

The principal peculiarity of this order lies in the stamens, the filaments of which are much dilated at the base and adhere by their margings, forming a cup, which incloses the ovary. This peculiarity has led to their being placed at a considerable distance from *Celastrineæ*, though in reality very nearly related. The two Indian genera are separated by three well marked points of structure. In *Hippocratea* the anthers open across the apex, the fruit is capsular, and the seed are winged. In *Salacia* the anthers open longitudinally, the fruit are baccate, and the seed wingless. They also differ in habit, in the former the flowers are panicled, in the latter, fascicled in the axils of the leaves.

Of the genus *Salacia* De Candolle described 12 species in 1824; between that date and 1842, 19 were added to the list, and the one here figured makes twenty, being equal to an increase of 160 per cent in twenty years. The number of new species throughout the vegetable kingdom generally, discovered in that time, certainly does not equal that average, though I believe it may with perfect safety be estimated at from 70 to 80 per cent. A most extraordinary fact, as affording a conclusive example of the very engrossing influence this most fascinating science is capable of exerting over the human mind, to have called forth such an astonishing amount of mere animal exertion, exclusive of the dangers surmounted and privations endured by its votaries, in the prosecution of their favourite pursuit. Linnæus in 1760 knew about 8,000 species, and estimated that 10,000 would comprise the flora of the world, 68 years after in 1828, Sprengel defined, in his species plantarum, 60,600, and now in 1845, descriptions of not fewer than 100,000 are scattered through our Botanical literature, and probably fully 20,000, still undescribed species, already exist[illegible] the Herbaria of Europe. At this rate, I believe, we may at a moderate computation, estimate the flora of the world at over 200,000 species.

SALACIA.

Calyx 5-cleft. Petals 5, inserted between the torus and the calyx. Stamens 3, inserted on the top of the torus or between the torus and ovary: filaments flat, distinct: anthers adnate 2-celled; lobes divaricating at the base, dehiscing longitudinally. Ovary 3-celled: ovules 2 or more in each cell. Style short. stigma obsoletely 3-lobed. Fruit indehiscent, fleshy, often 1-celled from abortion. Seeds solitary in each cell, wingless, covered with pulp.—Shrubs or small trees. Flowers in axillary corymbs, or more frequently, from the abortion of the common peduncle, on simple 1-flowered pedicels arising from a small axillary tubercle; rarely (ever?) in axillary dichotomous panicles.—*W. and A. Prod. p.* 104.

The species of this genus are for the most part rambling shrubs with numerous small aggregated axillary flowers and several with large fruit. The seed of this species and of our *S. oblonga* are large, fleshy masses without any appearance of cotyledons or radicle, so that their true structure, whatever that may be, will require to be made out by causing the seed to vegetate, a method which I neglected to adopt at the time of obtaining the specimens and am now unable to state what it is.

Salacia macrosperma (R. W.) a diffuse, rambling shrub; leaves oblong, elliptic, acuminated, coriacious, glabrous: flowers numerous, fascicled, short pedicelled: calyx 5-lobed fringed with rusty coloured hairs: petals ovate, obtuse, broad at the base: ovary 3-celled with 2-superposed ovules in each: fruit irregularly ovate, few seeded: seed ovoid conferruminate without a conspicuous radicle.

Jungles about Sispurah flowering, and at the same bearing full grown fruit in April.

This species seems nearly allied to my *S. verrucosa* but wants the warty stems, and has a ciliated, in place of glabrous, calyx. The plants, besides, when compared, seem quite distinct, though the differences are not easily stated in words. The structure of the anthers and ovary amply distinguish it from my *S. multiflora*; in this the anthers open longitudinally, in that transversely: here the ovules are two superposed in each cell, there they are numerous, forming two rows.

XIX.—SAPINDACEÆ.

This is a large order, exceedingly tropical in its habits, and interesting in an economical point of view from several of its species affording edible fruit, and others the well known detergent known under the name of soap-nut. The Lichi and Ramboatan are examples of the former, the fruit of several species of *Sapindus* supply the latter. It is not, however, my intention to dwell on this order, as, with one or two exceptions, all the species belonging to it are found on the plains or lower slopes; and being, therefore, purely tropical plants, scarcely come within the scope of these remarks on alpine vegetation. One species of the family, *Dodonœa viscosa*, certainly does ascend to the higher levels; but being much more abundant on the plains, and having no other peculiarity beyond its power of adaptation to different climates to recommend it to our consideration, need not be further noticed here. It may however be remarked, in passing, that it differs from most of the other plants of the family, in having simple, not compound leaves, the predominant form in this order, and in having no corolla. The want of a corolla is probably of less note than the other, as the flowers generally are unsymmetrical, parts being wanting or irregularly formed. The ovary is pretty constantly 3-celled, which, combined with the irregularity of the flowers, forms the principle distinguishing character of this family. This, however, is not constant, as in the genus *Schmidelia* two cells is the usual number. The following character and figure of that genus will serve to illustrate these peculiarities of the order.

SCHMIDELIA.—*Ins.*

Sepals 4, unequal. Petals 4, the fifth or superior one deficient, and its seat vacant, either naked on the inside or usually furnished with a scale above the unguis. Disk incomplete, with 4 glands opposite the petals. Stamens 8, inserted on the receptacle, and connate round the ovary at its base. Ovary usually 2-, sometimes 3-lobed: style from between the lobes of the ovary, 2-3-cleft, the segments recurved, longitudinally stigmatose on the inside. Fruit indehiscent, 1-2, or rarely 3-lobed: lobes somewhat globose, fleshy or dry, 1-celled. Seeds with or without an arillus.—Trees or shrubs, usually with trifoliate, rarely with simple, exstipulate leaves. Flowers white, small, in axillary racemes.—*W. and A. Prod. P.* 109.

The species of this genus are generally somewhat rambling shrubs, and when growing in thickets climbing among the trees and bushes often to a considerable height. When growing in open ground, they are low bushy shrubs. They resemble each other so closely that their discrimination is generally most difficult. The one here represented affords a striking example of this fact; a passing good figure of it was published by Rheede in the Hortus Malabaricus about 150 years ago, and yet, from that time until now, his plant has never been recognized, while the figure itself has been quoted by almost every writer on Indian plants for one or other of the recognized species. In our Prodromus it is quoted as a synonym for *S. Cobbe* with the addition "not good" which is most true, but for the plant here figured it is good. I have therefore dedicated the species to the memory of the original discoverer, feeling quite certain, at the same time, that it is his plant, partly from its likeness to his figure, and partly from having found it in Malabar as well as on the hills.

SCHMIDELIA RUXBURGII (R. W.) a diffuse shrub, all the young parts densely villous or tomentose: leaves elliptic, oblong, acute or acuminated, serrated, pubescent above; at first shortly tomentose, afterwards villous beneath: racemes axillary, solitary or sometimes paired, often longer than the leaves, branched; rachis hairy: calyx glabrous 4 sepaled, sepals unequal, lateral pair orbicular: petals 4 spathulate hairy with 4 fleshy glands at the base: ovary hairy, minute, style compressed ending in two spreading stigmas, berry two, or, by abortion, one lobed; lobes obovate obtuse, glabrous: cotyledons, fleshy, foliaceous folded,

Growing in thickets in Malabar and on the Neilgherry hills. The ripe fruit I have not yet found, but presume that it is alike the rest, a red, succulent berry. This is distinguished from all the other species I have seen by the rounded and under surface of the leaves being tomentose and by the many branched racemes.

XX.—MILLINGTONIACEÆ.

This small order, consisting of a single genus and five or six species, was first established by Mr. Arnott and myself in our Prodromus of the Peninsular Flora. The species are all large trees; and though there are but five known, they are widely distributed over India; 3 are found in Ceylon, and, proceeding northward, extend as far as Nepaul and Simla, and eastwards, to Silhet, Mergui, and Java, how much further I have yet to learn. Of the five known species, two certainly are found on the hills in great abundance, and probably another, though I have not yet observed it, which I found on the hills in the Madura district. Both the Neilgherry ones grow at great elevations abounding about Ootacamund, and more rarely descending so low as Coonoor or Kottergherry.

The natural affinities of this family associate it in many points with *Sapindaceæ*, from which indeed it seems scarcely distinct, as shown by the circumstance of *M. Arnottiana*, which was described from fruit only, being by us referred to that order under the name *Sapindus microcarpus*, in allusion to its small fruit as compared with other *Sapindi*; but, at the same time, I doubt whether, in tracing its affinities, sufficient attention has been bestowed on the examination of its relationship to *Anacardiaceæ* with which it most strikingly agrees in habit as well as in various points of structure. Both the hill species are large handsome trees, and, when in flower, very conspicuous, owing to the large panicles of their minute white flowers strongly contrasting with the deep green of their foliage.

One curious circumstance may be noted in regard to this small genus, the occurrence, namely, in it of simple and compound leaves. In families having both forms the simple leaved species usually have a jointed footstalks, indicating that it is simple by the abortion of some of its parts; in the simple leaved Millingtonias, no such joint exists; hence they are truly, not apparently, simple.

As there is but one genus in the order, the ordinal character is substituted for a generic one, there being no other with which to compare it to establish distinctions between them. The following, therefore, is the character of the order as well as of the genus.

MILLINGTONIACEÆ.—*Hook.*

Sepals 5, persistent, unequal, somewhat in a double series: æstivation imbricative. Petals 5, inserted on the margin of the receptacle, deciduous, alternating with the sepals, of two kinds; three outer ones orbicular, entire, with an imbricative æstivation; two interior smaller, acutely bifid, resembling scales. Stamens 5, opposite to the petals, and slightly united to them at the very base: three exterior sterile, opposite to the larger petals; two interior fertile, opposite to the bifid petals: filaments of the fertile stamens flat: anther-cells globose, dehiscing transversely, placed side by side on the inner side of the saucer-shaped connectivum. Disk flat, thin, hypogynous, free except at its point of attachment with the ovary and receptacle. Ovary ovate, 2-celled; ovules 2 in each cell, superposed. Style simple, short, and thick. Stigma slightly 2-lobed. Fruit a 1-celled, 1-seeded drupe; the dissepiment evanescent above, hardened and persistent at the base. Seed with a small cavity on the side, near the base. Albumen none, or extremely thin. Embryo curved: cotyledons thin, foliaceous, folded: radicle curved, pointing to the hilum.—Trees. Leaves alternate, without stipules, entire or pinnated. Inflorescence in panicles, terminal, or axillary near the extremity of the branches. Flowers small, inconspicuous, nearly sessile on very short peduncles that are arranged along the horizontal branches of the panicles.—*W. and A. Prod. p.* 115.

MILLINGTONIA PUNGENS (Wall.) leaves simple, coriaceous, lanceolate, acute at the base, quite entire, glabrous on both sides, nerves beneath with a rusty pubescence: panicle rigid, densely covered with a rusty pubescence; rachis terete; flowers on the ultimate branchlets of the panicle aggregated: calyx with 3 bracteoles; sepals unequal, glandularly ciliated: outer petals roundish, concave; inner ones cleft beyond the middle, equal to the filaments.—*W. and A. Prod. p* 115.

A large tree very abundant in the woods about Ootacamund—flowering during the warm season—Panicles large, terminal, flowers white, leaves thick and leathery; the branches of the panicle and the calyx clothed with short, matted rusty coloured hair. Fruit about the size of a pea, dark brown, nearly black, when ripe.

XXI.—AMPELIDEÆ.—GRAPE VINE TRIBE.

In an economical point of view this is an interesting order as being that which yields the grape vine; but this, the *Vitis vinifera*, is the only species belonging to the family of any real value to man. The Fox-grapes of America are used there for some purposes but can hardly be considered an exception to the rule, and still less can an Indian species from which, in Mysore, vinegar is sparingly prepared. In a Botanical point of view the family possesses considerable interest on account of the differences existing among Botanists both as regards its affinities, with other orders, and the difficulty which has been experienced in finding generic characters under which to arrange its numerous species.

It is not my intention here to dilate on either of these points, I shall therefore content myself by observing that its true affinities, as shown by uniformity of habit and structure of the flowers and seed, are unquestionably with *Araliaceæ*, and through them to *Umbelliferæ*, but, differing from both in the free, not adherent, ovary. The climbing habit, and especially, the mode of union of the leaves to the stem, combined with the valvate estivation of the petals and albumenous seed, all point to this relationship which is only opposed by the solitary difference of the superior ovary, or, in other words, the calyx being less developed and not adhering to the ovary. Influenced by these views, Endlesher has, in his genera plantarum, placed this order next *Araliaceæ* as suggested by Lindley; DeCandole also points

out this relationship, but being trammelled by the necessity of adhering to the artificial portion of his system, which groups families according to the more obvious structure of their flowers, had to place it among those with inferior or hypogynous flowers, though he saw that the true affinities connected it with perigenous orders.

The generic characters employed to divide this family are very unsatisfactory; and, as remarked by Mr. Brown, are hardly sufficient to supply sectional divisions. *Cissus* is separated from *Ampelopsis*, by having quaternary flowers, while *Ampelopsis* has quinary, those two genera being in all other respects the same. *Vitis* again, which also has quinary flowers, is distinguished from *Ampelopsis*, partly by the habit of the plants, namely, the compound coriacious leaves of the latter, and partly by the dehiscence of the flowers. In *Cissus* and *Ampelopsis* they expand from the apex as in most other plants while in *Vitis* the petals adhere so firmly at the apex that they generally separate from the base and fall off as one, like an extinguisher, so that a *Vitis* whose flowers by any chance open from above, becomes an *Ampelopsis* and an *Ampelopsis* by an opposite chance, becomes a *Vitis*. On these grounds, Dr. Wallich in his catalogue referred the whole there named to one genus, *Vitis*, a course in which we followed him in our Prodromus; and for the same reasons, I refer the accompanying figure to the genus *Vitis*, adding the as a sectional name *Ampelopsis*, on account of its quinary flowers dehiscing from the apex. Two other peninsular species are referrible to the same section, namely, *Vitis tomentosa* and *Vitis indica* of our prodromus.

VITIS.

Calyx nearly entire. Petals 4-5, distinct and patent, or united at the apex, but distinct at the base, and falling off like a calyptra. Torus elevated in the centre, and surrounding the lower part of the ovary, with which it is incorporated, girt at the base by a short ring (expansion of the torus) upon which the stamens are inserted. Ovary partly enclosed within the torus, 2-(or occasionally 3-) celled. Ovules 2 in each cell. Berry 1-2- (or occasionally 3-) celled, 1-4-seeded.—Peduncles usually changed, occasionally in whole or in part, into tendrils.—*W. and A. Prod. p.* 124.

All the species of this genus are rambling shrubs growing among trees and bushes, and, aided by tendrils, generally ascend to the top of their supports before they begin properly to flower. The Tendrils in this family consist of altered flower stalks, hence in the young plant they abound; when it has attained maturity they develop and become clusters of flowers. In Cissus and some species of Ampelopsis they are either all tendril or wholly floriferous; in the true vine they are partly both, that is, each cluster has a tendril, which is not the case in *Cissus* or the accompanying *Ampelopsis*, though both the others abovenamed have cirriferous peduncles.

VITIS (AMPELOPSIS) NEILGHERRIENSIS (R. W.) leaves coriacious, palmately trifoliolate, slightly mucronately dentate, middle one, broad oval acuminated, lateral ones unequal sided, like the centre one ending in a slender straight acumen: cymes terminal peduncles, longer than the leaves; flowers pentandrous, petals distinct.

This species I found at Kottergherry and Neddawottum, but at neither place have been so fortunate as to find it in fruit. The under surface of the leaves are sometimes coloured of a deep crimson: those from which the drawing was made were paler beneath.

Dr. Royle has described a nearly allied species from the Himalayas, but which differs in the form of the leaflets, as well as their being deeply serrated, and in having small, short peduncled, cymes. The venation of the leaves also differs considerably and shows at once they are distinct species. These distinctions are drawn from comparison of specimens.

XXII.—BALSAMINEÆ.—Balsam tribe.

Most of the families we have hitherto considered have shown a marked tropical or extra-tropical tendency, the one we are now about to consider may be viewed as possessing a transition character, being found in both the temperate and tropic zones. But though much more abundant in the latter than the former, its species are only found in perfection during the rainy and cool seasons, and it is in the more elevated and cooler regions they most abound. In illustration of this statement, I may mention that upwards of 20 species are found on the Neilgherries, of which only two or three are found to descend to the plains, and these only towards the western slopes, where their growth is promoted by the humidity of the climate. On the Pulney range, in like manner, where, during the autumnal months, a cool and humid climate prevails, I found ten or twelve species. On the more elevated portions of Ceylon they also abound during the rainy season. Thence they extend northward far as the Himalayas, always selecting the rainy and cool seasons as those during which they attain their greatest perfection. To the few met with in Europe the same observation holds true. Hence, though India may be looked upon as the head quarters of the family, they may still be considered a transition order as they are but sparingly found in the warmer regions, and then only during the coolest seasons.

Much has been written on the structure of the flower of these curious plants, and very different views taken of the nature of the parts of which they are composed until professor Kunth published his explanation which, for a time, was generally adopted; he sets out with the assumption that they are throughout quinary in the number of their parts, on the ground that they have 5 stamens and 5-celled ovaries. On this point there can scarcely be two opinions. The question then comes to be, how are we to discover 5 sepals and 5 petals among the six apparent parts of which the flower is made up. It is done thus, take, for example, *Impatiens fruticosa*. The upper two-lobed petal-like piece he considers 2 sepals soldered together: the lower sparred piece he also considers a sepal, and then there are the two lateral sepals, making in all 5—viz. 2 upper, 2 lateral, and 1 inferior. Within these are two lateral, 2 lobed petals: each of these he considers two soldered together, making four petals: the 5th, which should stand between the two upper sepals, he supposes wanting, or so united with them that it does not appear if present.

This explanation of the structure of the parts of a Balsam flower, though generally adopted at first, did not long remain undisputed. Professor Roeper took a very different view of the parts of the flower, and of course gave a different explanation of its structure, but one not so easily explained, except to persons conversant with descriptions of Botanical structure. He equally considers the flower a quinary one, but in place of considering the upper two-lobed part, two united sepals, he thinks it the odd petal. The spur, he considers, the odd sepal, then the lateral sepals as one pair, and two scales often absent; but when present, situated at the base of the odd petal, as the other pair: then the 2-lobed lateral petals, he, like Kunth, considers, each, two united, making four, which, added to the above, completes the number. The rarity of the scale-like sepals and their minuteness, when present, seems

adverse to this view: further, he requires that the spur, which is invariably pendulous, and the part of the flower most remote from the axis or stalk that bears it, that is when placed horizontally, should be considered, not normally so, but by a twist of the pedicel, and that its true position is posterior or next the axis. He, therefore, like Kunth, views the spur as the odd sepal, but thinks its proper position should be posterior next the axis, while Kunth considers it anterior or remote from the axis. Analogy and the position of the bracts are in favour of Roeper's view, the odd sepal of both *Tropæoleæ* and *Geraniaceæ*, two very nearly related orders, being posterior and often spurred. Should the odd sepal of *Balsamineæ* prove anterior, then it will stand, in that respect, in the same relation to these other orders, as *Leguminosæ* does to *Rosaceæ*, if posterior, they may all be united into a class. Should Roeper's view prove, as I believe it will, the correct one, it will go far to unite the four orders, *Balsamineæ*, *Geraniaceæ*, *Tropæleæ* and *Oxalideæ* into one great family, all having the same arrangement of the parts of the flower, all, except the last, having spurred sepals, and in all the spurred or odd sepal posterior. Dr. Lindley, in his school Botany, seems to take an opposite view of *Geraniaceæ*; as, in his diagram, he represents the odd sepal anterior, which is, I find, an error, perhaps of the printer. As such discussions are not easily followed without the assistance of figures, I shall introduce into the next part an undescribed species which I lately found, adding diagrams explanatory of the above descriptions.

Though thus affording an admirable field for the display of Botanical ingenuity, the plants of this family have nothing to recommend them to our attention except their beauty as flowers, and it is certainly surprising to me that they are not more prized by the florist, the common Balsam, *Impatiens Balsamina*, being the only one I have seen in cultivation, a distinction which, when double, it well merits. Many other species, however, are, in their natural state, much finer than the wild Balsam, and would, I believe, become much finer flowers if cultivated with equal care, such I conceive would be the case with either *I. fruticosa*, *I. scapiflora* or *I. fasciculata*, all most common on the hills during the rainy season, the latter ornamenting every swamp and ditch side with its numerous large rose-coloured flowers.

There are but two genera of this order, *Impatiens* and *Hydrocera*. The species of the former are very numerous; of the latter three or four only are yet known. Those of the former extend from the equator as far into the Northern temperate zone as Denmark; two are found in North America; Eastwards, they extend to Java and China, while a few are found in Southern Africa; of *Hydrocera*, three species only are known, one Indian, frequent in Tanjore, Malabar and Ceylon, one from Java and one from Madagascar. I have only found the Indian one on the plains, never assuming an alpine character.

IMPATIENS.—*Balsam.*

Sepals 5, apparently only 4 from the union of the two upper ones. Petals 4, apparently only 2 from the union of each of the lower to each of the lateral ones. Filaments 5, more or less united at the apex: anthers opening longitudinally or transversely. Ovarium 5-celled; cells formed by membranous

projections of the placentæ which occupy the axis of the ovary and are connected with its apex by 5 slender threads. Capsule elastically 5-valved, often 1-celled by the disappearance of the dissepiments. Seeds numerous or few.—*W. and A. Prod. p.* 136.

I here adopt our original generic character founded on Kunth's explanation of the structure of the flower, first as being easiest understood and being most consistent with appearances; and, secondly, because if I altered it, I must equally alter the characters of every species which are all drawn up in accordance with that view of their structure, and thereby do more harm, by the confusion and discordance that would be created between the two books, than would be compensated by any advantage to be derived from the more correct designation of the parts named in the description. According to Roeper's explanation; the first part of the generic character would run thus—Calyx, sepals 5, or by abortion 3, unequal, the posterior one, anticous larger, spurred or saccate at the base; lateral ones smaller, anterior pair minute or wanting. Corolla, petals 5, the anterior one posticous, suborbiculately-concave; the lateral ones united by pairs, sometimes lobed. Stamens &c., as in the character above. In a practical point of view, in the discrimination of species, no advantage would be obtained from the change.

IMPATIENS FRUTICOSA (D. C.) erect, branched: stems glabrous, glaucous: leaves alternate, long-petioled; upper side hairy, particularly on the veins; under tomentose: petioles villous, glanduliferous: peduncles glabrous, shorter than the leaves, dividing into several long 1 flowered pedicels: flowers shorter than the spur; lateral sepals large, concave, roundish-ovate, acuminated: filaments united at the apex: stigmas combined: capsule glabrous, tapering at both ends.—*W. and A. Prod. p.* 137.

This noble species I have only found about Kottergherry and Coonoor, it seems to be in flower the greater part of the year. The specimen figured was gathered in August, and I afterwards found it in full flower in March. Is usually met with on the banks of streams, in clumps of jungle and in such situations I have seen it upwards of 8 feet high, nearly every branch as richly covered with flowers as the figure. This species is well adapted for showing the compound nature of the lateral petals.

IMPATIENS SCAPIFLORA (Heyne) glabrous: root tuberous: leaves radical, orbicular, deeply sinuate-cordate, the lobes overlapping, coriaceous; under side pale, marked with numerous coloured nerves; scape bearing a many-flowered racemo, bracteated: pedicels alternate, solitary from each bractea, slender, in fruit becoming deflexed: lateral sepals ovate, small: spur sometimes tumid and inflated, sometimes much elongated: petals 2 lobed; posterior lobe small; anterior elongated, projecting forward.—*W. and A. Prod p.* 137.

This very beautiful but unusual form of Balsam occurs in great profusion in dry pastures all over the upper range of Hills, but is most plentiful about Dodabet, flowering from July till October or November, but is in greatest perfection in September when it is most conspicuous. In this the lower half of the compound petals is lobed, affording a useful specific character.

IMPATIENS MODESTA (R. W.) leaves few, radical, broadly cordate-ovate, or sub-orbicular, hairy above; glabrous and pale shining glaucous beneath: scape erect racemose many flowered; flowers small, rather long pedicelled, from the axil of a small subulate bractea: upper sepal broad obovate or suborbicular, the lateral ones narrow lanceolate or subulate incumbent on the upper; lower shorter than the petals with a short obtuse spur: petals declining, 3 lobed (lower petal two cleft upper entire) hairy near the attachment: capsule glabrous ovate. (R. W. *Madras Journal.*)

Damp woods about Pycarah, flowering July and August. Plant from 8 to 12 inches high, leaves from 1½ to 2 inches broad flowers from 10 to 20. Petals approximated and, until closely examined, the whole flower has much the appearance of an Orchidacious plant. This description is taken from plants growing in shady woods on the top of the Hills at Shevagherry near Courtallum, but quite corresponds with the Neilgherry plant.

IMPATIENS RUFESCENS (Benth.;) stems erect, branched, jointed, glabrous: leaves shortly-petioled, from elliptic and slightly cordate to obovate, sharply serrated; upper side hispid with short callous hairs; under glabrous and whitish, except the nerves which are hairy: pedicels solitary or in pairs, about the length of the leaves, villous: posterior sepals much smaller than the petals; anterior saccate, without a spur: anterior lobes of the petals oblong, protruded, much larger than the short roundish posterior one: capsule oval, glabrous.—*W. and A. Prod. p.* 138.

Frequent in swampy grounds and on the marshy sides of small streams, flowering during the rainy season, but may be met with in flower the greater part of the year near springs, where the ground is always wet. This species affords an example of the great inequality in the size of the two halves of the compound petals and of a saccate not spurred sepal.

IMPATIENS INCONSPICUA (Benth.;) branched, diffuse, glabrous: leaves opposite, nearly sessile, from oval to linear-lanceolate, slightly cordate at the base, remotely and slightly bristle-serrated; under side pale, glaucous: pedicels solitary or several together, shorter than the leaves, pubescent: lateral sepals nearly equal to the flowers, linear; lower one gibbous without a spur: capsule oval, glabrous, few-seeded.—*W. and A. Prod. p.* 139.

This minute and little known species I have only found on Dodabet and on the top of the hill immediately beyond and to the south of Elk Hill: in the latter station among craggy exposed rocks. It flowers in November, and, but for its abundance where it does grow, would indeed be truly inconspicuous. This like the preceding, is distinguished by its unequal, petals and saccate not spurred sepals.

Impatiens leschenaulzii (Wall.) suffruticose erect, branched; branches ascending, almost glabrous: leaves alternate, short petioled, ovate lanceolate, acuminated, acute at the base, glabrous, with bristly incurved serratures: petioles without glands: pedicels solitary, shorter than the leaves: lateral sepals minute, caducous: spur slender, tapering, rather longer than the flowers, curved upwards: capsules small, drooping, glabrous, ovate, pointed, few-seeded.—*W. and A. Prod, p.* 136.

This is one of the most common species on the Hills, being found in every thicket and in flower at all seasons. It is quite a shrub in its habit and often attains a considerable size. In shady woods and moist soil I have seen it fully 8 feet high. It is so nearly allied to *I. latifolia* as to be scarcely distinguishable by technical characters, but, when seen growing side by side, they are readily recognized. The flowers are pale rose colour or nearly white; those of *I. latifolia* pink and considerably larger.

Impatiens Gardneriana (R.W.) diffuse, glabrous, at first procumbent, rooting at the joints, afterwards ascending: leaves verticelled in threes, short petioled, ovate, lanceolate, acutely serrated, some of the lower serratures bristle pointed: pedicels solitary, longer than the leaves, filiform: lateral sepals ovate, acuminate, shorter than the petals, anterior ovate pointed, with a filiform spur as long as the flower and slightly gibbous at the point; posterior about the length of the posterior lobes of the petals: petals obovate, very obtuse, the upper lobes a little shorter than the larger anterior ones: capsule oblong, pointed, small, glabrous.

Western slopes of the Neilgherries about 5 miles below Sisparah in moist pasture, flowering in January and February.

I dedicate this species to my friend George Gardner Esq., superintendent of the Royal Botanic Garden, Ceylon, who accompanied me during the delightful excursion, in the course of which we found this and many other interesting novelties.

Owing to the delay which has taken place in the printing of this part I have been enabled to introduce the description of this plant in this its proper place, and the plate itself will be given in the second part, the greater part of the plates for which are already printed.

In the plate will be found two sets of diagrams A. and B. elucidating the views of Messrs. Kunth and Roeper explained above—A. representing the position of the parts as understood by Kunth B. as understood by Roeper. In these diagrams the dark lines a,a,a,a,a, represent the parts respectively called sepals by these savants, and the double lines b,b,b,b,b, the petals. From these it will be seen at a glance that, while Kunth allows only four petals, united by pairs, and 5 sepals, the upper two of them united into one, that Roeper accounts for only three sepals constantly present and 2 minute ones only occasionally found, but gives the full number of petals as always present; the upper or posterior compound sepal of Kunth being viewed by him as the anterior petal, he accounting for this reversed position of the flower on the supposition that the pedicel has got a twist in the course of its growth, a view which is supported by analogy, a similar disposition of parts being met with, in both *Tropæolum* and *Pelargonium* two truly allied tribes. And is still further supported by the genus *Hydrocera* which is simply a regular flowered Balsam. The two dissected flowers given in the plate are similarly marked so as to show, by the corresponding letters, the parts indicated in the diagrams: the other figures require no explanation.

XXIII.—PITTOSPORIÆ.

This is a small family scarcely including, so far as yet known, 100 species. It may with propriety be considered extra-tropical, though many of its species are found within the tropics, since the bulk of the family is from the extra-tropical portions of New Holland, and the tropical ones only occur on the more elevated alpine regions. Three species at least, there may be more, are found on the Neilgherries; one abounds on the Shervaroy Hills, two are found on the more elevated regions of Ceylon; while I do not recollect having once seen one on the plains or subalpine parts of India. Mr. Brown in 1814 stated that the species of *Pittosporum* had a very wide range in both the northern and southern hemisphere, occurring in New Holland and the islands of the southern Pacific; in the Moluccas, China, Japan, and even in Madeira in the northern. Since then, the number of species has been nearly quadrupled, extending their range from Nepal southwards through India to Ceylon, the Mauritius, Cape of Good Hope, and Canaries.

In regard to the affinities of the order, Meisner has well remarked "ordo valde adhuc insertæ sedis." Brown, adverting, I presume, for I have not his paper to ascertain, to the fact that some of the species of Pittosporum had been referred to Celastrus, remarked, when indicating the order, that it is widely different from *Celastrineæ* and *Rhamneæ*, but did not mention its affinities. De Candolle, in adopting the family, placed it beside *Polygaleæ* which it certainly approaches through *Xanthophyllum*. Ach. Richard thinks it allied to *Rutaceæ* by a crowd of characters. Lindley adopts this view in the first edition of his Natural System, but groups it *Ampelideæ* and *Olacineæ* in his second, two orders, by the way, not very closely allied to each other. Arnott, in our Prodromus, placed it next *Celastrineæ*, an arrangement which has been adopted by both Meisner and Endlicher. This, I dare say, is as correct a view as any of the preceding, but still the relationship seems far from being near. In their flowers, *Pittosporeæ*, judging from *Pittosporum* alone, seem to approach *Rutaceæ*, while their 2-celled ovaries erect ovules and very minute embryo at the base of a copious dense horny albumen, more nearly associcate them with *Vitis*: with *Olax* it appears to me, the relationship is remote.

In regard to the properties of the order little seems to be known. One yields finely veined timber, and the fruit of another is eatable. The seed of all the Pittosporums I know, are enveloped in a viscid resinous secretion exhaling a strong turpentine odour, which is also given out by the leaves when bruised.

PITTOSPORUM.

Sepals 5. Petals 5, the claws approaching each other, and forming a tube, Capsule 2-3-valved, 1-celled, the valves bearing the placentæ along their middle or at their base. Seeds covered with a resinous pulp.—Shrubs with persistent entire leaves.—*W. and A. Prod. p.* 153.

This genus, as already stated, has, within the last 20 years, been vastly extended. In 1824, D.C. gave characters of 11 species; in 1844, Walpers compiled a supplementary list of 41, which had been published in the interval, and, beyond doubt, there are still many unpublished species remaining to be added. One, if not two, I have in my Hill collections, but not yet determined. Both the Ceylon ones will, I suspect, also prove distinct from the Indian ones when opportunities occur for their comparison. The one here figured is common in the clumps of jungle about Ootacamund, flowering abundantly in February and March. The fruit requires several months to attain maturity.

Pittosporum tetraspermum (*W. & A.*) leaves elliptic-oblong, acute, coriaceous, glabrous, margins slightly waved and recurved: flowers in a terminal sessile umbel; peduncles aggregated, usually 1-, rarely 2-flowered, pubescent: sepals pubescent, lanceolate, acuminated, minute, many times shorter than the corolla: petals linear: ovary hairy: style glabrous: stigmas 2-lobed: ovules 2 in each cell: capsule nearly globose, scarcely compressed, 4-seeded; valves thick-coriaceous.—*W. and A. Prod. p.* 154.

Ootacamund in clumps of jungle: a large shrub flowering in February and March. The figure differs in two points from the character which was taken from dry specimens. The stigma is 4, not 2-lobed, and the capsules are somewhat compressed. The lobes of the stigma are at best so minute that a mistake might easily have happened, and the capsules are at first perfectly globose but become flattened when quite mature. The dark streak on the longitudinal section of the seed does not represent the embryo which the draftsman has failed to detect, being very minute and situated at the base of the seed. *P. Neilgherrense* is also found in the jungles about Ootacamund and Pycarrah; a third undescribed species is found at Sisparah, all of which are in flower at the same time

XXIV.—CELASTRINEÆ.

This family, though including only about 250 species, has a very wide range, every quarter of the globe claiming some of them as its own. From the equator they extend on either side far into the temperate zone, and, though frequent within the tropics, are still more abundant beyond them. Though, to this extent, an extra-tropical family, I feel yet disposed to view it as pretty equally divided, or probably even the tropical forms predominate as a tropical climate prevails many degrees beyond the tropic. The extra-tropical tendency, however, of so large a portion of the order may perhaps account for their frequency on the Neilgherries. Here we find *Turpinia*, three or four species of *Euonymus*, 4 or 5 of *Microtropis* several of *Celastrus* and high on the slopes *Pleurostylia* and *Elæodendron*. Since the publication of DeCandolle's Prodromus the number of described species has been doubled. He divided the order into three tribes or sub-orders, *Staphyliaceæ*, *Celastrineæ* and *Aquifoliaceæ* or *Ilicineæ*. More recent writers have elevated each of these to the rank of distinct orders. This arrangement I only partly adopt here.

The distinction between *Staphyliaceæ* and *Celastrineæ* rests principally on habit, the former having compound, the latter simple, leaves. Beyond that I can discover no essential difference, and that, judging from analogy, seems scarcely deserving of having so high a value assigned to it. As a sectional character it is good, but scarcely amounts to an ordinal distinction, I have therefore preserved DeCandolle's section in preference to adopting Lindley and Bartling's order, though the latter has been taken up by Endlicher and others. *Aquifoliaceæ*, on the other hand, have been removed from this to the following sub-class, on account of a difference in the position of the petals and stamens relatively to the ovary.

In all the preceding orders these parts are said to be Hypogynous, that is, attached close under, or, as it were, round the neck of the ovary, and not into the calyx. In this and the following they are attached to the calyx, distinct from the ovary, and hence are said to be Perigynous, that is placed round about (not under) the pistil. In the former, the sepals may, and sometimes do, drop leaving the corolla and stamens, in the latter that cannot happen: here they may, and generally do, fall leaving the calyx, but the calyx cannot fall, leaving them. In the perigynous orders the calyx is moreover generally more or less tubular at the base, and lined with what is called a disk or torus to which the petals and stamens are attached. DeCandolle, availing himself of these structural differences, has grouped together all the orders in which they are found to form his sub-class of *Calyciflorae*, in contradistinction to the Hypogynous orders, of which he forms another sub-class under the designation of *Thalamiflorae*.

His third tribe *Aquifoliaceae* differs from the rest of the order in having a monopetalous hypogynous corolla bearing the stamens: it has therefore been removed, and formed into a new order, under the name of *Ilicineae*, and placed in the next sub-class distinguished by having their petals cohering, forming a Monopetalous Corolla, with an inferior attachment, which he has distinguished by the name of *Corolliflorae*.

These explanations of this part of DeCandolle's system I have deemed necessary, to show the grounds on which more recent observers have departed from the arrangement of that great Botanist, in removing one of his sections to form a distinct order in a different sub-class.

TURPENIA.

Flowers polygamous or bisexual. Calyx 5-partite, persistent. Petals 5. Torus discoid, with a free 10-crenulated margin. Stamens 5, inserted under the margin of the disk, alternate with the petals: anthers ovate, dehiscing longitudinally. Carpels 3, follicular, at first distinct or separable, soon combining into one ovary, lower part immersed in the disk: ovules 2-8 in each carpel. Styles 3, separable. Stigmas patent, flat, cuneate. Fruit baccate, 3-celled (or with fewer cells by abortion). Seeds 1-3 in each cell, bony and shining, truncated at the hilum, fixed along the axis or to its apex. Albumen fleshy.—Trees or shrubs. Leaves opposite, unequally pinnated; leaflets coriaceous, glabrous, stalked, ovate or oblong, acuminated, serrated. Flowers white, panicled: branches of the panicle alternate (in the American species) or opposite (in the Indian).—*W. and A. Prod. p.* 156.

Only 5 species of this genus are yet known, one of which, is a native of Mexico, two inhabit Jamaica, and two India. One occurs at Newera Ellea in Ceylon, apparently distinct from, but very nearly related to, ours; both are moderate sized, very famous trees, the leaves pinnate, with from 3 to 5 leaflets, and corymbose inflorescence.

TURPENIA NEPALENSIS (Wall.:) leaflets 3-5, oblong lanceolate, acuminated, coriaceous: branches of the panicle opposite: styles almost quite distinct: ovules 3, or occasionally 2, in each cell: berry (immature) scarcely fleshy, marked on the outside above the middle with 3 small distant points (the remains of the styles), about 3-seeded: seeds pendulous: radicle superior.—*W. and A. Prod. p.* 156.

A very common tree on the Hills, and to be found more or less perfectly in flower at all seasons, but in greatest perfection in May and June. It seldom attains a considerable height; but its branches when it has room to spread, extend on all sides forming a fine head.

EUONYMUS.—*Spindle tree.*

Calyx 4-5-parted. Petals 4-5, sessile. Torus a fleshy orbicular disk. Stamens 4-5, inserted on the surface of the disk, between the margin and ovary: base of the filaments persistent, and forming glandular projections on the torus: anthers with a thick connectivum at the back, opening transversely or longitudinally. Ovary immersed in the disk, with as many cells as petals: ovules 2 in each cell. Style short and thick. Stigmas united into one, obtuse or lobed. Capsules 4-5-celled, 4-5-valved, loculicidal. Seeds 1-2 in each cell.—Trees or shrubs, sometimes climbing by means of roots thrown out by the stems. Leaves opposite. Peduncles axillary. Flowers occasionally with a fourth or fifth part additional.—*W. and A. Prod.* p. 160.

This is a large genus inhabiting Europe, Asia and America, and generally found in the more temperate regions of those tropical countries where it occurs. There are now nearly 50 known species. They are not easy of discrimination, the genus being a very natural one, with a strong family likeness running through the whole. Three, probably more, are found on the Hills, namely, the one delineated, by far the most abundant; another very like, but abundantly distinct, occurring on the western slopes below Siaparah, which like this, attains the size of a tree, the third, *E. Gaughii*, I have not myself found, *and E. India?*

EUONYMUS CRENULATUS (Wall.:) leaves elliptical, obtuse, short petioled, crenulate-serrated towards the apex, coriaceous, convex and bullate above: peduncles solitary, shorter than the leaves, once or twice dichotomous, few-flowered: petals 5 (or occasionally 6) orbicular; stamens very short; anthers opening transversely: margin of the torus free: style very short: stigma blunt, somewhat umbilicated: capsules turbinate, 5-celled, lobed at the apex: seed solitary in each cell; hilum truncate, without an arillus.—*W. and A. Prod. p.* 161.

This plant often attains the size of a considerable tree; but more commonly it occurs as a large and often very handsome shrub, on account of its numerous ascending branches covered with abundance of bright shining foliage. The flowers, as seen on the growing plant, are but little conspicuous being small and hid by the profusion of leaves. They are of a dull purple colour, and not generally so numerous as on the specimen selected for representation. In the above character of the species, the seed are said to be without an arillus. This is not quite correct. The arillus is present but much smaller than usual in the genus. One of the ovules only in each cell usually matures, the remains of the other is shown in figures 8 and 9, sometimes, however, they both ripen.

MICROTROPIS.

Calyx 5, parted imbricated, corolla 5-petaled perigynous inserted into the outer edge of an annular disk, æstivation imbricated. Stamens alternate with the petals rising from the edge of the disk. Anthers introrse, dehiscing longitudinally, sometimes alternating with short epipetalous scales (squamulæ 5, breves, epipetalæ staminibus alternantes. Arn.) Ovary semi-superior 2-celled with 2 dependent collateral ovules in each: style short, conical: stigma obtuse, obscurely four-lobed. Capsule superior 1-celled, two-valved, but usually dehiscing on one side only. Seed solitary, rarely paired, erect: testa thin, succulent, coloured. Embryo, erect, enclosed in a copious firm tenacious albumen: cotyledons foliaceous: radicle cylindrical.

Shrubs or trees, leaves entire opposite, exstipulate, glabrous, shining, coriaceous. Cymes axillary or from the scars of fallen leaves, either furnished with longish pedunculs or subsessile, forming dense capitulæ on the older branches. Flowers small white, sepals and petals orbicular concave, very coriaceous. Fruit capsular, oval oblong pointed with the persistant base of the style; capsule corticose (resembling bark in colour and texture) testa thin, friable, somewhat resembling semi-indurated pulp, and, in all species I have seen, deeply coloured: albumen tenacious, translucent, easily scutila: cotyledons, when fresh gathered, green, but not quite so deeply coloured as represented in the plates.

This genus was named by Dr. Wallich, but without a character, in his List of Indian plants. Lindley adopted it in his Natural System but without defining it. Dr. Meisner and Arnott having got specimens, both published characters quite independent of each other. Their generic characters are both good so far as their imperfect materials enabled them to go, but both admit of alterations. The materials in my hands being more perfect than those they had, has induced me to endeavour to render more perfect their characters. The part I have described as the testa of the seed, Roxburgh has called an arillus ("*Semina solitaria arillo tenui succulento involuta.*" Arnott from Roxb.) I do so from finding no other part corresponding to that organ, from its completely investing the seed, without any opening, which a true arillus must have, and from its being distinctly vascular, showing that it cannot be merely indurated pulp. I have not observed in any of the Hill species the epipetalous scales mentioned by Arnott. In Arnott's character the ovules are said to be ascending, in all the Neilgherry species the ovules are pendulous, the seed erect, and the radicle inferior. How this change of position is brought about still remains for investigation.

When Dr. Arnott published his remarks on this genus, he doubted whether it belonged to this order, a point on which there cannot, I think, be any longer a doubt, even supposing the corolla gamopetalous. This it certainly is not, but polypetalous, the petals attached to a disk. This structure is most easily made out in the unopened flower bud.

MICROTROPIS MUCRONATA (R. W.) an erect shrub: leaves opposite ovate, mucronate, entire, glabrous, shining above, glaucous beneath: petals obovate cuneate broad at the apex, cymes axillary, dichotomous shorter than the leaves, capsule subcylindrical slightly attenuated at the base, pointed, testa of a rusty brown colour.

Kotteghery, in dry jungles, flowering July and August, at the same time bearing clusters of ripe seed. The shrubs from which the specimens were taken were 8 or 10 feet high, branches, ascending leaves ovate from 12 to 16 lines long, 4 to 6 broad. The flowers had not quite opened at that time and the open flower, figure 2 was opened artificially. No. 1 shows the unopened corolla after the removal of the calyx.

MICROTROPIS OVALIFOLIA (R. W.) a large somewhat diffusely ramous shrub: leaves oval, rounded at both ends: cymes axillary, trichotomous shorter than the leaves: petals orbicular, fruit oblong oval, obtuse, testa crimson.

Ootacamund, frequent in moist woods, flowering in February and March, but may generally be found in flower at other seasons.

In their outline the leaves are very constant, but are often much larger than those represented, being sometimes nearly 2½ inches long by 1½ broad. These two are very nearly allied species but, I think, quite distinct.

MICROTROPIS RAMIFLORA (R. W.) a moderate sized tree: leaves subsessile, slightly cordate at the base obovate obtuse or slightly emarginate reflexed, very coriaceous: flower subsessile, aggregated in dense clusters along the naked branches: petals somewhat obovate: fruit oblong obtuse: testa of a reddish orange colour.

Ootacamund in thick jungles. This is the largest species I have yet met with, being quite arborious. The leaves are from two to three inches long by about 2 broad, exceedingly hard and coriaceous. When in full flower, all the younger branches are as densely covered with flowers as in the specimen figured.

There are three or four other species found on the hills, two referrible to the ramiflorous division, and another, or perhaps, two, to the cymose.

XXV.—RHAMNEÆ.

This is a family of considerable extent as regards the number of species and is very widely distributed over the world. De Candolle, in 1825, defined 230 species; and, if the increase has been in the same ratio as *Celastrineæ*, we may with safety assume that it now includes 400 known species. Though most abundant in the lower latitudes of the temperate zones, it yet extends to near there extreme limits in both hemispheres but has not been found beyond. Within the tropics they are also numerous. This being, however, upon the whole, a more decidedly extra-tropical than Tropical family, it seems rather curious that so few species are found on the higher ranges of the Neilgherries. I can only at this time recollect three decidedly mountain species, two of *Rhamnus* and one of *Scutia* the latter still undescribed and which I should have introduced here had I sooner become acquainted with it. This family was formerly combined with *Celastrineæ* but is readily distinguished by the form and position of the petals. Here they are small, scale-like, and placed immediately behind the stamens, not alternate with them as in *Celastrineæ*. This is a character of greater value, than might at first sight be supposed as it indicates that one series or row of stamens has been suppressed.* In a regularly formed flower each series of parts is alternate with the one behind; hence, the petals are alternate with the sepals, the first row stamens with the petals, but opposite the sepals, the second row alternate with the sepals but opposite the petals. If the stamens are equal in number with the petals, and opposite to them; it indicates that the first row, which would have been alternate, is suppressed. This then, is the principal distinguishing mark between *Rhamneæ* and *Celastrineæ*, which are in other respects nearly related.

The affinities of these two orders are not by any means clear to me. That they are very nearly related to each other is certain: that they are nearly related to *Terebinthaceæ* seems also certain. Lindley has, moreover, long insisted on the near relationship existing between them and *Euphorbiaceæ*. That this order is related especially to *Rhamneæ* is unquestionable, whether so closely as to entitle *Euphorbiaceæ* to be placed between *Rhamneæ* and *Celastrineæ* is, to my mind, questionable; though, to be sure, it is small matter which is first or last so long as really nearly related orders are brought together and formed into family groups in the manner attempted by Lindley in his alliances, and by Endlicher in his clapis.

In its economical relations this is, perhaps, a more important order than the preceding, though its properties are of very mixed and anomalous character. The berries of *Rhamnus catharticus* are a violently cathartic and under the name of Buckthorn were formerly employed a good deal in medicine. The juice of them made into a syrup is still occasionally so employed. The same juice mixed with a little alum and evaporated to a proper consistence affords the colour called sap green. As a contrast to that, the fruit of the Jujube tree *Zizyphus Jujuba*, is edible, so also are the succulent peduncles of the *Hovenia dulcis* a Chinese plant of this family, while the leaves of *Segeretia Theezans* another Chinese plant of the order, are used by the poorer classes there as a substitute for tea. Such anomalies in so natural a family are of rare occurrence.

RHAMNUS.—*Buckthorn.*

Calyx urceolate, 4-5-cleft. Petals wanting; or 4-5, either nearly flat, or slightly convolute and emarginate at the apex. Stamens with ovate 2-celled anthers. Torus thin, lining the tube of the calyx. Ovary free from the calyx and not immersed in the torus, 2-3-4-celled. Styles 2-4, more or less, connected or distinct. Fruit fleshy, containing 2-4 indehiscent cartilaginous nuts; one of them occasionally abortive. —Shrubs or small trees. Leaves alternate or rarely opposite, stipuled, short-stalked, feather-nerved.—*W. and A. Prod. p.* 164.

Only two species of this genus are known in Southern India both of which occur in considerable abundance on the hills, but more especially *R. Wightii*, which is very abundant in the thickets about Ootacamund. In appearance it does not agree well with the one here represented, and perhaps it may be doubted whether it ought to be looked upon as a true *Rhamnus*; but while my acquaintance with this genus is so limited I cannot venture to separate it. The other is I think a genuine Rhamnus and very nearly related to the original species *R. Catharticus*.

RHAMNUS HIRSUTA. (W. & A.) young branches pubescent, spinescent; older ones glabrous with a white cuticle: leaves opposite or alternate, ovate, or oblong lanceolate, with a short sudden acumination, serrulated, membranaceous, nearly glabrous above, beneath hairy, particularly on the nerves and veins; pedicels from the base of the young shoots, 3-6 together, pubescent, as long as the petiole: calyx 4-cleft: petals obovate, obtuse, entire, flat: ovary 2-3 celled: styles 2-3, connected to the middle, then diverging; the upper part jointed with and deciduous from the persistent lower half: fruit 2-celled: seeds plano-convex, with a deep furrow at the base on the outer convex side.—*W. and A. Prod. p.* 165.

A considerable shrub rather extensively distributed on the Hills, but not so common on the higher ranges as lower down. The specimen delineated supplies a somewhat flattering likeness as it usually presents a rather scraggy appearance. It is to be met with in a flower at almost all seasons, but is not so free as the other in bearing fruit.

GOUANIA.

Calyx 5-cleft; segments spreading. Petals 5, convolute or cucullate. Stamens 5, enclosed within the petals: anthers ovate, 2-celled. Disk concave or flattish, 5-angled, the angles opposite to the petals; the sides usually produced opposite to the calycine-segment, and forming a stellate disk, the accessory angles being either entire or 2-horned or truncated. Ovary connate with the bottom of the tube of the calyx, covered over by the disk, 3-celled. Style 3 fid. Fruit inferior, with 3 angles or keels or wings, consisting of 3 separable dry coriaceous compressed indehiscent carpels (*mericarps*), which are attached to a central tripartite filiform receptacle.—Usually climbing shrubs, with the branches often, from abortion, converted into tendrils. Leaves stipulated, alternate, feather-nerved, somewhat 3-nerved at the base from the lower nerves being largest and arched. Flowers usually fascicled on leafless branches, forming interrupted spikes or racemes, rarely umbellate or racemose in the axils of the upper leaves. Fruit, as in the Umbelliferæ, but consisting of 3 instead of 2 mericarps.

This genus partakes much more of the tropical character than the other and is only found on the lower slopes. The specimen figured was gathered some distance below Coonoor. Only one other species is found in Southern India. They are both rambling scandent shrubs, clinging by means of their tendrils to others among which they grow.—*W. and A. Prod. p.* 166.

GOUANIA LEPTOSTACHYA (D. C.) branches glabrous: leaves ovate, acuminated, slightly cordate at the base, coarsely crenate-serrated, glabrous: racemes interrupted, axillary or in terminal panicles, elongated, when young, pubescent, afterwards glabrous: flowers on very short pedicels, polygamous: disk glabrous, stellate; accessory angles partly adnate to the calycine lobes, free and acuminated towards the two-horned apex: fruit glabrous, shortly winged,—*W. and A. Prod. p.* 166.

An extensively straggling climbing shrub, found in great abundance along the road between Burliar and Coonoor, flowering towards the end of the year and maturing its fruit during the hot season. We formerly supposed this species confined to the Northern parts of Peninsula, a point on which, it now appears we were mistaken.

XXVI.—LEGUMINOSÆ.

This is a most extensive and interesting family of plants second only to *Compositæ* in the number of its species and, viewed in connection with its economical relations to man, casting that gigantic Natural order far into the shade. This is indeed a splendid family being, in every point of view except the mere number of its species, the first of the vegetable kingdom and even as regards number, the difference between it and *Compositæ* is by no means so great as was once supposed. It was, I have heard, the belief of Professor DeCandolle when entering on the herculian task of preparing, for his invaluable prodromus, a synoptical monograph of Compositæ that that family included about 14,000 species: but when the whole were brought to light the actual number proved to be little more than half, or about 8000, to which probably about 1000 have since been added. The number of *Leguminosæ* described by him 20 years ago in the same work, was about 3,500 species. Since then the number has been nearly, if not actually, doubled, thus placing those two great orders more nearly on a par than could have been anticipated.

This family embraces within its extended limits some of the largest trees of the forest and the smallest herbs of the meadow: it supplies man with much wholesome food for himself and excellent fodder for his cattle, with some valuable medicines and numerous drugs, useful in the arts; the trees supply him with abundance of valuable timber, while the bark provides cordage and coarse cloth. Such are some of the numerous claims of this family to his attention and consideration in an economical point of view, exclusive of the gratification he derives from their contemplation as ornamental objects suited to gratify the senses by the beauty of their forms and the elegance and fragrance of their numerous rich and variously coloured flowers.

This Natural order of plants naturally divides itself into two principal sections, distinguished in the first instance by the direction of the radicle of the seed, namely into *Curvembriæ* having the radicle bent down on the edge of the cotyledons and *Rectembriæ* having the radicle straight. These distinctions are easily ascertained by merely peeling a seed and observing the direction of the growing points. The plants thus separated by that minute point of structure are more widely severed by other marks taken from the habit, inflorescence, and form of the flowers; and also by properties.

To the first of these divisions belong the vast tribe of *Papilionaceæ* including peas, beans, in a word the whole Pulse family. In this division the flowers, with a few exceptions, are all papilionacious, or pea flowered: a name derived from some fanciful resemblance they bear to a butterfly. To the second belong *Cæsalpineæ* including the bonduc, sapan, logwood, senna, &c., all having more or less regular flowers, and the *Mimoseæ* in which they are perfectly regular and otherwise very dissimilar from the rest of the order, but which is at once recognized as belonging to it by the presence of a legume. These two sections thus afford a beautiful and striking example of the value of characters derived from the seed which, though minute and apparently in themselves of small moment, are yet, when followed out, indicative of the greatest differences in the characters of the vegetation.

This can be shown in another way, thus. The *Curvembriate* section, according to DeCandolle's enumeration contains about 2,604 species. Of these 910 are natives of the equinoctial zone, and 1,277 of the northern hemisphere beyond the tropic, the remaining 417 of the southern. The *Rectembriæ* amount to 829, of these 692 are tropical, 35 are natives of the northern hemisphere beyond the tropics, the remaining 102 belong to the southern hemisphere where the *Mimoseæ* greatly abound. These examples show that the Rectembriæ are comparatively tropical in their distribution while the Curvembriæ have a more marked extra-tropical tendency. This fact is curiously confirmed by what we find on the Hills. Here, so far as I can at present recollect, only three or four native species of Rectembriæ are found, and even one of those a doubtful native, while the Curvembriæ abound. On the slopes and near the bottom of the Hills the Rectembriæ attain their usual tropical proportion. These are interesting facts in regard to Botanical Geography.

In their affinities *Leguminosæ* approach most nearly to *Rosaceæ* so nearly indeed, that when the extreme forms of each family are compared, but one constant distinguishing mark is found by which to separate them, and that derived from the flower. In *Leguminosæ* two sepals and one petal, the odd one, are next the axis or branch on which it grows: in *Rosaceæ* one sepal, the odd one, and two petals are next the axis. This is invariable!

It may, and with much reason, be asked what possible relationship can exist between a pea pod and a cherry or peach, or in other words between a legume and a drupe or apple, the former the fruit of a Leguminous plant, the latter of a Rosaceous one. Strange as it may appear, the relationship is much closer than could at first sight be suspected. A pea shell is composed of a soft tender outside skin lined with a dense tough parchment like membrane which can be easily peeled off. A cherry or peach in like manner has a soft pulpy outside, lined with a hard bony shell forming the stone, which contains the kernel. The pulp and stone correspond therefore with the two parts of the pea shell and the kernel with the pea. And there are one and two seeded pods, as well as one and two kernelled drupes. Here then we find the same parts in both, only differing in texture. And when the comparison is carried further we find in some genera succulent pods on the one hand and less pulpy drupes on the other, until the two actually meet in *Ditarium*, a leguminous genus with drupaceous pods, which, but for the floral character, must have been referred to *Rosaceæ*. In the apple and pear too we find the cells of the fruit lined with parchment-like membrane the same as the pod and covered like it with a fleshy outside only more abundant: an apple then or pear is simply a congeries of 5 pods ranged round an axis enveloped in a common pulp and enclosed in a single enlarged and adherent calyx. *Leguminosæ* have relationships with many other orders but none so near or so striking as with *Rosaceæ*.

SOPHORA.

Calyx 5-toothed, campanulate, or somewhat attenuated at the base. Petals of the keel usually combined at their apex. Legume moniliform, not winged, several seeded.—Trees, shrubs, or herbaceous plants. Leaves irregularly pinnated, often without stipules. Racemes terminal, simple or panicled.—*W. and A. Prod. p.* 179.

This is a widely diffused genus though as yet only 17 species are described. Siberia, Nepaul, China, Neilgherries, Ceylon, Havanah, Brasil and Peru, have each one or more species. The one here given is the

only one I have seen on the Hills, but Captain Munro found a second with red seed apparently *S. heptaphylla* which he discovered in jungles below Nedawuttum.

DeCandolle places the tribe *Sophoreæ* at the head of his arrangement, Endlicher, I think with advantage removes it to a station more advanced, placing it next *Cæsalpineæ* to which they approach through their free stamens, thus forming a connecting link between the Curvembriæ and Rectembriæ, having the Papilionaceous Corolla of the former, and the free stamens of the latter, the radicle being, moreover, less distinctly curved than in the true *Papilionaceæ* and sometimes even straight.

SOPHORA GLAUCA (Lesch.) shrubby: leaflets 19-23, elliptical, mucronate, upper side glaucous and velvety, under villous: racemes terminal, crowded.—*W. and A. Prod. p.* 179.

This is an abundant and very handsome shrub in flower at all seasons.* It is met with in every wood and also in the hedge rows and thickets about the houses. It is an erect growing ramous plant rising to the height of from 8 to 12 feet, particularly conspicuous by its numerous long erect racemes of pale purple flowers. The young branches, leaf—stalks and under surface of the leaves clothed with soft velvety pubiscence. Leaves unequally pinnate, leaflet about 12 pairs, ovate oblong, mucronate, glaucous above: racemes erect, many flowered, each flower furnished with a subulate bractea. Calyx tubular, obtusely 5 lobed, about half the length of the petals. Vexillum shorter than the wings, emarginate, retuse. Legumes tomentose moniliform. Seed oval polished hard, radicle inferior nearly straight.

This very ornamental shrub merits a place in every garden and shrubbery as with a little care in pruning it might be much improved in appearance.

CROTALARIA.

Calyx 5-lobed, somewhat 2-lipped; the upper lip 2-, the lower 3-cleft. Corolla: vexillum large, cordate, with scales or callosities at the base: keel falcate, usually tapering to a point, more rarely obtuse. Filaments all united; sheath usually cleft in its upper part. Legumes turgid: valves ventricose, inflated. Seeds compressed, reniform, usually several.—Herbaceous or shrubby plants. Stipules and bracteas sometimes minute or wanting, sometimes large. Leaves simple or palmately compound, with 3-5-7 leaflets. Flowers usually yellow.—*W. and A. Prod. p.* 180.

This is a most extensive genus, in the papilionaceous tribe second only to Astragalus in the number of its species which now amount to about 250. They are generally large flowered showy plants, with very few exceptions, of tropical or subtropical origin and for the most part natives of Asia and America. In habit they are shrubby or herbaceous many of the latter very small. Though the species are thus numerous, yet they are upon the whole of easy discrimination owing to the numerous well marked groups into which they can be classed. Very few of the species are in an economical point of view useful to man. The genus being principally of tropical origin but few are found on the Hills, but those that do occur are usually among the most handsome that are met with in this part of India.

CROTALARIA BARBATA (Graham:) herbaceous, erect, densely clothed with dark brown hairs: stipules minute, inconspicuous: leaves oblong-lanceolate, bluntish; racemes terminal, elongated: flowers few, distant: calyx a little shorter than the corolla, deeply 5-cleft, very hairy; segments slightly falcate: legume glabrous, stalked, 2-3 times the length of the calyx, obovoid: apex of the style and stigma woolly.—*W. and A. Prod. p.* 181.

This fine species is not uncommon in the woods about Ootacamund in moist soil near streams, &c. It attains a considerable size and is easily recognized by the unusual hairiness of all the young parts and its large conspicuous blossoms. When growing among bushes in favourable soil it sometimes attains the height of 10 or 12 feet but this is not common. It turns black in drying and in the herbarium is a course shaggy looking plant, a glance at the dissected seed fig. 10 will explain the nature of a curved radicle.

CROTALARIA FORMOSA (Graham!:) erect, branched, all over villous except the upper side of the leaves: stems terete: stipules minute, setaceous, reflexed: leaves cuneate, obovate, obtuse, glabrous on the upper side, villous beneath: bracteas lanceolate, acuminated, lower ones without flowers: flowers in a dense raceme at the extremities of the bracteated elongated branches: bracteoles setaceous, on the middle of the pedicels: calyx villous; legume oblong, broader upwards, glabrous, about 4 times the length of the calyx, many-seeded.—*W. and A. Prod. p.* 186.

This species is met with most in pasture grounds on the sides of the higher hills. It is very abundant along the Kaity road flowering in great perfection in February and March but is not confined to these months. It is well named "*formosa*" being indeed a beautiful species. It is a small erect shrubby plant from a foot and half to two feet high but in very favourable situations occasionally as high as 6 feet each branch terminated as here shown, by a rich compact cluster of pale yellow flowers streaked with brown. The upper surface of the leaves is of a deep pea green the under whitish from a dense covering of white hairs.

CROTALARIA WALLICHIANA (W. and A.:) herbaceous, erect, much branched, young branches irre-

gularly and rather bluntly angled, with the racemes and under side of the leaves densely pubescent: stipules lunate, transverse, recurved; leaves oval, glabrous above, marked beneath with rather prominent nerves: racemes terminal and leaf-opposed, many-flowered: bracteas subulate, reflexed, small: pedicels elongated, longer than the calyx: bracteoles very minute, setaceous, about the middle of the pedicel: calyx smaller than the corolla, densely pubescent; legume clavate-oblong, stalked, softly pubescent, many-seeded.—*W. and A. Prod. p.* 187.

This species abounds in the woods and thickets of Ootacamund but is by no means confined to them. It prefers rich moist soil and seeks support from the surrounding trees and bushes. In such situations it is no uncommon occurrence to see it attain the height of from 10 to 15 feet. It is in flower at all seasons quite enlivening the thickets among which it grows with the number and brilliancy of its blossoms. In its characters and general appearance it approaches, perhaps, too nearly to *C. semperflorens*, from which it appears hardly distinct.

INDIGOFERA—INDIGO FAMILY.

Calyx 5-cleft; segments acute. Vexillum roundish, emarginate: keel furnished with a subulate spur on both sides, at length often bending back elastically. Stamens diadelphous (9 and 1). Style filiform, glabrous. Legume continuous, one or more seeded, 2-valved. Seeds usually truncated, separated by cellular spurious partitions.—Herbaceous or shrubby. Stipules small, free from the petiole. Peduncles axillary. Flowers racemose, purple, blue, or white; many of the upper ones of each raceme frequently becoming abortive. Leaves various, usually unequally pinnated or digitate; hairs, either all or some of them, adpressed and attached by their middle.—*W. and A. Prod. p.* 193.

This, like the preceding, is a numerous and polymorphous, but, upon the whole, natural genus, though characterized by a single point of structure, the peculiar spur on the keel petals, well shown in the dissected flower of *I. pedicellata*. They are further distinguished by a peculiarity of their hairs which is, I believe about equally invariable throughout the genus, that, namely, of being attached by the middle and having two free ends in place of one, the usual form. This peculiarity however is not limited to this genus.

The genus includes about 200 species, some of them large shrubs, as for example *I. pulchella* and many minute herbs almost inconspicuous when nestling among the grass where they grow. Many of them have little short or round pods with one or two seeds, while others again have as many as twenty. The *Indigofera* are mostly of tropical or subtropical origin, hence very few are found on the more elevated ranges on these hills, though lower down they are sufficiently numerous.

INDIGOFERA PULCHELLA (W. and A. Prod.) large erect shrub or small tree, young parts usually whitish with short adpressed hairs; branches angled: leaves pinnated; leaflets 8-10 pairs, obovate or broad elliptic, emarginate, mucronate; racemes about the length of the leaves, sessile, many-flowered, springing from the axils of the leaves and from the former years' leafless branches: flowers large, at first crowded, afterwards more distant: calyx-segments short and acute; petals many times longer than the calyx, patulus and resembling a bilabiate corolla: legumes scattered along the rachis, slightly deflexed, nearly cylindrical, thick, straight, sharp-pointed, 10-12 seeded; sutures callous, thick.—*W. and A. prod. p.* 203.

This very beautiful species abounds about Coonoor quite ornamenting the brush wood by the road side for nearly two miles on either side of that place. Judging from a specimen so named in my collection with which I have compared it, this plant seems nearly if not quite identical with Roxburgh's *I. elliptica* but does not differ sufficiently from his *pulchella* to admit of my considering it distinct. About Coonoor it is a shrub, varying from four to as many as 8 feet in height and when in full flower, which it is in February, is a beautiful object as the figure will show. It is to be met with in flower nearly all the year.

INDIGOFERA PEDICELLATA (W. & A.:) suffruticose, procumbent; branches filiform, sprinkled with short adpressed brownish hairs: older parts terete; young parts compressed, thickly covered with brown glands: leaves petioled, palmately trifoliate; leaflets cuneate oblong; both sides with short whitish hairs mixed on the under sides with glands: racemes almost sessile, somewhat corymbiform, about the length of the leaves: pedicels slender, drooping, 2-3, longer than the calyx: calyx deeply 7-cleft (segments linear and acute), and with the vexillum and keel hirsute and glandultiferous.—*W. and A. Prod. p.* 200.

This is one of the more minute procumbent forms. It is found in all the pastures about Ootacamund, spreading on all sides among the grass, but only rendered conspicuous by its clusters of bright crimson flowers which raise themselves above the herbage which usually conceals the rest of the plant.

DESMODIUM.

Calyx with two usually caducous bracteoles at its base, cleft to the middle into two lips; upper lip 2-cleft; lower 3-partite. Corolla papilionaceous, inserted into the base of the calyx: vexillum roundish: keel obtuse, but not truncated. Stamens diadelphous (9 and 1), or monadelphous from the base to the middle and usually diadelphous upwards: filaments somewhat persistent. Ovary with several ovules. Style filiform. Stigma capitate. Legume compressed, composed of several joints: joints 1-seeded, separating at maturity.—Herbaceous or suffrutescent plants or small trees. Leaves either pinnately trifoliolate, or simple by the abortion of the lateral leaflets. Partial stipules 2 at the base of the terminal leaflet, solitary at the base of the lateral ones. Flowers usually racemose, sometimes umbelled, sometimes on simple peduncles, axillary or more usually terminal. Flowers purplish, blue, or white.—*W. and A. Prod. p.* 223.

This, like both the preceding, is a genus abounding in species inhabiting the tropics and warmer parts of Asia, Africa, America and Australia. The number of its species, already described, exceeds 150 and are as varied in the forms they present as those of either of the preceding. They, in common with the rest of the tribe, are distinguished by their peculiar jointed legume or *lomentum*, as that kind of pod is designated. They are herbaceous or shrubby in their habit and are very variable in their forms and the situations in which they are found, but notwithstanding this tendency to assume different forms, the genus seems upon the whole a natural one, as it has scarcely undergone, in the hands of subsequent writers, any alterations since its first publication in DeCandolle's Prodromus, though in the mean time half as many more species have been added to it as he described. It is principally of tropical origin and, though there are about 20 Peninsular species, only two or three are found on the hills, and these not on the higher levels. Neither of the two here delineated are found so high as Ootacamund but both occur at Coonoor and *D. strangulatum* in woods about Pycarah and elsewhere about the same level.

Desmodium rufescens (DC.:) shrubby: branches, racemes, bracteas, pedicels, stipules, petioles, and nerves of the leaves beneath, densely clothed with yellowish-brown tomentum: leaves trifoliolate; leaflets oval, obtuse with a long bristle; upper side glabrous; under densely clothed except the nerves with adpressed silky white hairs, especially when young: stipules caducous: racemes axillary and terminal, many flowered: bracteas ovate, tapering to a long subulate point, before expansion densely imbricated, soon caducous: vexillum large, obcordate: alæ as long as the broad keel: legume pubescent, about 7-jointed, straight on the one suture, notched into the middle on the other.—*W. and A. Prod. p.* 228.

This is about the handsomest of the Indian species. It is a low shrub between two and three feet high, growing in moist soil among brushwood and by roadsides.

The specimen delineated was gathered on the roadside a little below Coonoor. It is generally to be met with in flower but in greatest perfection during the rainy season. It is a subalpine species rarely met with on the plains though I have very frequently found it in alpine jungles both on the continent and in Ceylon.

Desmodium strangulatum (W. and A.) herbaceous, erect?: branches hairy, somewhat 3-angled, angles obtuse: leaves 3-foliolate, long petioled: leaflets pubescent on both sides, lateral ones obliquely ovate, terminal one rhomboid: stipules scariose, oblong-lanceolate, concave, glabrous: racemes hairy, axillary and terminal, panicled, at first oblong and imbricated with large oblong concave hairy bracteas, afterwards becoming very long and lax, few-flowered: flowers 2-3 together, on long filiform pedicels: calyx campanulate, bilabiate; upper lip emarginate, under deeply cleft: vexillum obovate; alæ shorter than the keel: stamens monadelphous from the base to the middle, diadelphous towards the apex: ovary stipitate, about 4-ovuled: legume 2-3 jointed (occasionally from abortion 1 jointed), much contracted on one suture between the joints, even on the other, hispidly pubescent; joints semi-oblong, nearly equal on both ends. —*W. and A. Prod. p.* 228.

A slender, erect growing, herbaceous plant a native of shady woods in moist rich soil. The very unusual colour of its flowers, deep orange, renders it a conspicuous object in such situations. That, combined with the deep divisions of its pod, readily distinguishes it from the rest of the genus.

SMITHIA.

Calyx scariose, with two bracteoles at its base, bipartite: segments entire or slightly cleft. Corolla papilionaceous, inserted into the bottom of the calyx: keel cleft from the base to near the apex. Stamens 10, equally monadelphous (5 and 5). Legume 4-6-jointed, folded up within the calyx, very much contracted between the joints: joints 1-seeded, orbicular: sinus rounded.—Procumbent herbaceous plants with abruptly pinnated

leaves. Leaflets few, ciliated with adpressed bristles. Stipules semisagittate. Racemes axillary, few-flowered. Corolla yellow.—*W. and A. Prod. p.* 220.

This is a small genus but as regards the discrimination of the species a most difficult one. There were originally but two species, the number has been since much increased and must, I believe, from among the various forms met with on the Hills be still further augmented by probably as many as two or three species. This however is a point not easily determined, for I think I have never met with a genus in which it is so difficult to find characters by which to discriminate the species, even in cases where to all appearance they are quite distinct. Indeed in the present instance I feel almost quite certain that the elements of two species are to be found in the accompanying plate. The figure of the plant and dissections of the flower are taken from one specimen, and the figure showing the pod from another. The calyx which accompanies the pod is glandular and hairy within, that belonging to the specimen delineated is glabrous and eglandular, but the plants seemed the same. There are only six known and distinguished species of this genus, 5 of which are Indian and four of these I suspect natives of the Hills, namely, S. *sensitiva*, *racemosa*, *blanda*, and *paniculata*. Through the kindness of Mr. Law of Bombay I have other two, namely S. *genistiflora*? remarkable for bearing purple flowers and a new species which I propose dedicating to the discoverer.

SMITHIA BLANDA (Wall) suffruticose, diffuse, everywhere, except the upper surface of the leaves and corolla, hairy: leaves abruptly pinnate 3 paired; leaflets linear, elliptic, obtuse, mucronate; glabrous above, hairy beneath: racemes, axillary and terminal: flowers congested towards the apex: calyx 2-lipped, upper lip bifid, under 3-cleft; without pellucid glands or dots. R. W. MSS.

Pycarah in moist swampy soil flowering in July. A low growing diffuse plant, leaves abruptly pinnate, 3-paired: leaflets about half an inch long and half as broad, linear elliptic, rounded at the apex, mucronate, under surface hairy, glabrous above, flowers yellow.

In the accompanying figures, No. 3 showing a magnified view of the bracts, calyx and stamens, is from a flower picked from the specimen represented. No. 6 showing the calyx and pod belongs to apparently another species, and is introduced partly to show the form of the pod of the genus, partly to indicate a specific distinction, the one being perforated with transparent glands which are wanting in the other. The glandular one is probably S. *racemosa* but of this I am uncertain, as I have not authentic specimens of either it or of S. *blanda* for examination, and the character under consideration is not indicated in the published definition of either species.

FLEMINGIA.

Calyx ebracteolate at the base, acutely 5-cleft; the four upper segments about equal, the lower one usually much longer. Corolla papilionaceous: vexillum without callosities; the spurs inflexed at the margin: keel falcate. Stamens diadelphous (9 and 1). Ovary 2-ovuled. Style glabrous. Legume sessile, oval, turgid, 2-seeded, without a partition between the seeds. Seeds nearly globose; hilum small; caruncula inconspicuous or wanting.—Shrubby or suffrutescent. Stipules scarious, lanceolate; sometimes very large, usually deciduous. Leaves petioled, digitately trifoliolate or simple: under side usually dotted with small glands; the nerves prominent, parallel, long and simple. Partial stipules wanting. Racemes axillary, solitary or aggregate, sometimes panicled. Flowers several together. Legumes more or less pubescent.—*W. and A. Prod.* p. 241.

This genus, founded by Roxburgh in honor of his friend Dr. Fleming is pre-eminently an Indian one, none of its species having, so far as I am aware, been found except in India and the countries adjoining. I have specimens of some of its species from Moulmain and Ceylon, but it seems not improbable they extend to Malacca and far Eastward. All the species except the one here represented are erect growing plants usually with long erect racemes of flowers. The one figured differs, therefore, so widely in habit from the rest of the species, that I had some difficulty in persuading myself that it really belonged to the genus.

Owing, apparently, to some of the species having at first been referred to the genus *Hedysarum*, DeCandolle placed it in his tribe *Hedysareæ* to which it clearly does not belong. It is now, though somewhat at variance with its usual twining habit, referred to the tribe *Phaseoleæ*. Several species besides the present are natives of the Hills, especially towards the Koonda range.

FLEMINGIA PROCUMBENS (R. W.) herbaceous, diffuse, procumbent, hairy: leaves palmately trifoliolate; middle leaflet obovate, lateral ones ovate, slightly unequal at the base, hairy above, nearly glabrous, except the veins, beneath: peduncles longer than the leaves: flowers capitate: calyx deeply 5-cleft, divisions linear, lanceolate, acute, about the length of the corolla: ovary 2-seeded: stigma capitate hairy: legume shorter than

the calyx usually, by abortion, one-seeded: seed oval.

Pycarah in pastures, frequent. A very diffuse plant lying flat on the ground and spreading all round, extending from 12 to 18 inches from the root, leaves about an inch long and 8 lines broad, under the surface sprinkled with minute garnet coloured glandular points, flowers dark dull purple.

XXVII.—ROSACEÆ—ROSE TRIBE.

This in comparison with the preceding is a small family but contributes fully as much, or perhaps more, to the luxuries of life, though less to the wants of mankind than its more bulky neighbour. To this we are indebted for a large proportion of the finest European fruits such as apples, pears, quinces, medlars, cherries, plums, peaches, nectarines, apricots, strawberries, raspberries, and blackberries, and many more of inferior note. Here also we find as ornaments the charming rose, the fragrant May, the elegant Service and Mountain Ash trees while our flower borders are ornamented with the varied Potentillas, Dryases, Meadow-sweets &c. In this again we have one of the most curious anomalies to be met with in the vegetable kingdom an extensive family in which there is not a poisonous fruit, yet yielding to the Chemist the most intensely active and deleterious agent to animal life yet known in nature, namely, the Prussic acid so abundantly produced by the leaves of the cherry-laurel, peach, almond, &c. trees.

The fact just mentioned, of its producing no poisonous fruit, is interesting, especially to travellers, since any one may with perfect confidence eat the fruit of any Rosaceous plant he happens to encounter though he has never seen it before.

In their geographical distribution are *Rosaceæ* peculiarly extra-tropical a very few only being found within the tropics and these at considerable elevations. Of the small number, about 15 species recorded as natives of the Indian Peninsula 11 perhaps 12 are found on these Hills, while there is not one to be met with on the plains except the Loquat, an introduced tree which rarely if ever bears fruit near the level of the sea, but does so abundantly at Bangalore, 3,500 feet above it.

In its Botanical relations this family is to the full as intricate as *Leguminosæ* but like it, all its various forms are linked together by one constant character, the posterior position of the odd sepal of the calyx. It is always next to the axis, however different or unlike the plants may be in all other respects.

To facilitate the discrimination of its species, which are often very dissimilar, they like *Leguminosæ* have been grooped into suborders, in which the genera that most nearly associate are brought together. These groops or suborders are—1st. *Dryadeæ* including the potentillas, strawberries, raspberries, &c. 2d, *Roseæ* including the true roses. 3d, *Pomeæ* including apples, pears, medlars, hawthorn, &c. 4th, *Amygdaleæ* including plums, peaches, cherries, &c.; and 5th, *Sanguisorbeæ* a suborder that might with advantage be removed to another division of the system as a distinct order.

This enumeration of the parts of which the whole is composed will show how complex that whole must be and the deep knowledge of vegetable structure, in connection with vege-

table relationships, that must have been required to trace the affinities by which they are united. Who, for example, except a most profound and philosophical investigator of vegetable structure could have traced any relationship between a rose and a strawberry, or between a raspberry and a peach, or not less extraordinary, between an apple and a cherry, or many other still more, apparently, irreconcileable contrasts that might be adduced.

Incongruous as such associations may appear they have all been most distinctly made out and are now considered in Botany as well established facts as that two and two make four. To explain how these relationships are proved is not an easy matter since to trace them requires, at starting, a considerable knowledge of structure in its most primary forms. Attention however to the following easily observed points will tend to show that the demonstration is quite possible.

The general character of the whole order is to have 5 sepals, two pairs and an odd one, the odd one being always posterior or next the axis while the odd petal stands opposite it on the other side of the flower. The stamens and petals in all are perigynous that is inserted on the disk of the calyx at some distance from the ovary (see all the accompanying figures) and with one exception, the seed in all are without albumen, to these may be added that the stamens generally exceed twelve and are often very numerous and the ovules, except in Pomeæ, pendulous. In addition to these points of agreement the rose and strawberry agree in having numerous one seeded carpels with the seed suspended from the apex of the cell, and in their style rising from the side not the apex of the carpel.

But the rose differs in having its carpels inferior enclosed within the tube of the calyx, or rather, it may be called, a hollow receptacle formed of the dilated apex of the peduncle: while the Strawberry has its carpels superior attached to a spongy receptacle, which swells and becomes sweet and succulent as the fruit attains maturity, in depressions of the surface of which its little nuts nestle. Thus the fruitification is the same in both, all except the receptacle, which is a hollow concave cell in the one, a projecting convex spongy body in the other. This one difference great as it is, is not considered of sufficient importance to constitute them distinct orders. *Potentilla* only differs from the strawberry in the structure of its receptacle: in Potentilla it is elevated but dry and at maturity does not like the strawberry come away with the seed or nuts but remains attached to the calyx. The Raspberry and Bramble differs from both, in the fruit the receptacle of which is dry and elevated as in the Potentillas, but the carpels, in place of being little dry nuts, as in them, are miniature drupes or stone fruit, that is, each seed or stone is enclosed in a succulent pulpy covering the same as the stone of a cherry or plum. Here then is the first decided gradation between the *Potentilleæ* and *Amygdaleæ* tribes, the difference between them being that in Raspberries &c. there are a congeries of miniature drupes spread over a superior receptacle and a persistent calyx; while in Cherries &c. there is only one carpel, in the middle of the flower, and the calyx is deciduous. These differences are esteemed of less value than the others by which the two tribes are connected, hence the *Amygdaleæ* are considered merely a suborder of the family of *Rosaceæ*, the more so, as in this tribe we find non-succulent fruit the same as in the other, as for example *Pygeum* (No. 59) which has neither a stone nor pulpy covering for its seed, but is yet considered a truly amygdaleous tree.

Having thus shown how nearly *Roseæ* and *Potentillea* associate and how brambles and raspberries pass into cherries and plums it now only remains for me to endeavour to trace the connection between these and *Pomeæ* or apples, pears, hawthorns, &c. In this tribe the calyx corolla and stamens are the same as in the others, except that the calyx is tubular at the base and more or less perfectly encloses the carpels or ovaries. These vary from two to five having two erect, not pendulous (as in the other) ovules in each, and as the fruit advances to maturity the calyx and outer coat of the carpel increases in size and thickness until in course of time it becomes an apple inclosing the carpels which in most of them, are not hard and bony as in the drupe. Here are striking points of difference: but to set against them we have the inferior fruit of the rose: we have the enlarging receptacle of the strawberry, the thickening of the outer coat of the seed vessel of the plum, peach, &c., and we have the bony seed of the hawthorn, one of the pomeæ, and the want of it in Pygeum one of the amygdaleæ. The difference therefore is reduced to the erect ovules and the seed vessels being enclosed in the enlarged and prolonged calyx, to which in this family only a subordinate value is assigned; and this also is therefore reduced to the rank of a suborder thought at first sight so very unlike all the others.

It must be acknowledged that it is no easy matter to construct a general character calculated to include the whole but still it has been accomplished. Endlicher however, the last writer on the subject, has preferred raising Amygdaleæ and Pomaceæ to the rank of distinct orders in which I am disposed to go along with him at least as regards the latter as tending to render our characters less prolix while they more clearly define the limits of our orders. I particularly mention Pomeæ, because I think sufficient importance has not in this case been attached to the difference of position of the ovule which, added to the difference of habit properties and relative position of the carpel and calyx, form a combination of characters, in my opinion, quite sufficient for the purpose; the essential difference depending on the direction of the ovule. Ovules pendulous seed inverted would then form the essential distinction of *Rosaceæ*—While ovules erect seed ascending would, combined with the other characters of Rosaceæ, characterize *Pomeæ*.

I have dilated on the interesting peculiarities of these two remarkable families as affording such numerous and striking, but upon the whole, easily explained, examples of fruits most dissimilar in appearance but which, when properly analysed and traced back to their origin, can easily be shown to be in their elementary structure nearly the same and owing their differences at maturity to adventitious circumstances often the creatures of art not of nature. Who from looking at a luscious peach or plum, and a scraggy bean or pea pod, could ever suspect that in their earlier stages they were all structurally alike, or who untaught, could imagine the parts of a raspberry and a cherry so exactly alike that the former is, as it were, but a heap of miniature cherries sticking together. Such analytical investigations of structure through all its stages, *ab ovo usque ad mala*, constitutes the Philosophy of Botany, and forms the foundation on which the beautiful super-structure of the Natural classification of plants, is built.

FRAGARIA—STRAWBERRY.

Calyx concave at the bottom, 5-cleft, with 5 bracteoles. Petals 5. Stamens numerous. Achenia juiceless, scattered on a fleshy and succulent deciduous polyphore or receptacle. Style lateral. Seed suspended.—Herbaceous plants throwing out runners. Leaves trifoliolate: leaflets coarsely toothed. Receptacles or polyphores roundish, succulent, red or whitish.

This genus though the number of species is inconsiderable has a wide geographical range: Europe: North and South America beyond the tropics: and Nepaul, Neilgherries, Java, China, and, I think, Ceylon in Asia: but in all tropical Asiatic stations at considerable elevations. Two species are found on the Neilgherries, a large proportion (4) of the whole recorded species. The one *F. elatior* is also found in Europe, America and China, the only station assigned for the other was Nepaul until discovered here.

Several species are more or less extensively cultivated for their fruit, but the *F. Vesca* and its varieties by far the most extensively. To offer any remark on the excellence of this fruit would be waste of time, as who requires information on that point? but as regards its cultivation on the Hills, a passing remark may be made—which is, that those desirous of enjoying this fruit in something approaching to European perfection, must plant it afresh every year. Those produced from two year old plants I have almost invariably observed, are sparing in quantity and indifferent in quality, unless perhaps in those rare instances where they find a very congenial soil and exposure. When growing in low situations and annually exposed to frost in sufficient intensity to destroy the foliage, as in Europe, the case may be different, but generally the rule is to take one crop, which lasts about six months, and then plant afresh.

FRAGARIA ELATIOR (Ehrh.) leaflets somewhat coriaceous: hairs on the petioles, peduncles, pedicels and calyx widely spreading: calyx in fruit reflexed: bracteoles similar to the calycine segments.—*W. and A. Prod. p.* 300. *Fragaria Nilagirica.* (Zenker.)

Very common about Ootacamund, to be met with in flower and fruit all the year, but the latter most abundant in May, June and July. The flower and fruit white, the latter, with occasionally a pale rose blush on the side exposed to the sun. It has little flavour, but a sweetish watery taste. Eaten with the addition of lime juice and sugar, it is admired by some.

FRAGARIA INDICA (Andrews) leaflets obovate: peduncles axillary, solitary, 1-flowered: bracteoles patulous, cuneate, much larger and broader than the entire calycine segments, deeply 3-5-toothed at the apex.—*W. and A. Prod. p.* 300.

Frequent in shady woods where the soil is somewhat moist. Unlike the rest of the genus, the flowers are yellow. The fruit is a bright red, very tempting to the eye, but watery, mawkish and disagreeable to the taste.

POTENTILLA.

Calyx concave at the bottom, 4-5-cleft, with 4-5-bracteoles. Petals 4-5. Stamens numerous. Achenia numerous, collected into a head on the flattish persistant dry receptacle. Style lateral. Seeds suspended.—Herbaceous or suffrutescent plants. Leaves compound. Stipules adnate to the petiole. Flowers white or yellow, rarely red.—*W. and A. Prod. p.* 300.

This genus is one of great extent, including nearly if not fully, 200 species, but of that vast number few only are found within the tropics, none so far as is yet known, on the plains of India. Two only occur on the Hills, one of these, (No. 63) is very common, the other though much less so, not actually rare, but, from being a marsh plant, less seen owing to its being liable to be hid among the rank vegetation.

It is a genus so very nearly allied to the strawberry, that one of its species was long confounded with it, under the name of *Fragaria sterilis*, in allusion to its not producing any fruit resembling a strawberry, which as being a true Potentilla it could not do; the distinction between the two genera as already mentioned, resting on the one, strawberry, having a large spongy succulent receptacle for the seed, while that of the other is dry. Many of the species of this genus are cultivated as garden ornaments, and two or three introduced into England from Nepaul, are indeed very ornamental: among these may be mentioned *P. atro-sanguinea, Nepalensis*

and *splendens*. Many others are in cultivation, but these are the principal Indian ones that have found their way to Europe.

POTENTILLA LESCHENAULTIANA (Ser.:) covered all over with silky long hairs: stems decumbent at the base: radical and lower leaves pinnated, longish petioled; leaflets 5, cuneate-obovate, obtuse, incise-toothed, the lower pair smaller than the others: upper stem leaves palmately 3-5 foliolate; leaflets about equal and similar to the larger leaflets of the radicle leaves: stipules large, ovate-lanceolate; lower ones often entire; upper toothed or deeply cut: flowers in terminal forked panicles, or corymbose: calycine segments and bracteoles about equal, oblong-lanceolate, more or less obtuse: petals (yellow) slightly obcordate, about equal to the calyx: receptacle villous: carpels slightly wrinkled.—*a*; stems short; panicles small, corymbiform.—*W. and A. Prod. p.* 301.

This is a very common plant, being found almost on every road or ditch side, as well as spreading among the grass on all sides. It is often, or rather is generally procumbent, but also occurs as here represented, erect. The fruit in this species approaches more nearly to that of the strawberry, than is common in the genus, owing to the large size and spongy texture of the receptacle, but still it is a true potentilla.

PHOTINIA.

Calyx 5-toothed. Petals reflexed. Ovary half-adhering, villous, 2-celled, 4-ovuled. Styles 2, glabrous. Pericarp bilocular (rarely from abortion unilocular and 1-seeded), inclosed within the fleshy calyx. Testa of the seeds cartilaginous.—Trees. Leaves simple, coriaceous, evergreen. Panicles corymbose, terminal. Fruit small.—*W. and A. Prod. p.* 302.

This genus includes 12 recorded species, but some of these doubtful, two of the 12 are natives of the Neilgherries, both common, both beautifully flowering trees, and the fruit of both about the size of peas, and possessing the taste of the fruit of the mountain Ash so exactly, that any one on tasting them would at once pronounce them the fruit of that tree. Between the two genera *Photinia* and *Pyrus*, the difference seems slight, if indeed a truly essential difference exists. In Pyrus the ovary is usually 5 or 3 celled, and here it is two, but two also occurs in Pyrus. Exclusive of this, the other points of distinction mentioned in the characters of the two, seem differences but not distinctions, as they are not of a nature to be permanent in a number of species. The essential character of this is styles 2, ovary 2 celled, while that of Pyrus is, styles 5 or 3-ovary 5-3 celled. In this tribe as already mentioned, the ovules are erect, the seed ascending, and the radicle inferior. In the plate the draftsman has reversed the position of the seed and represented the radicle superior, a blunder which trusting to his general accuracy, I did not detect until I came to examine the character of the tribe, with a view to the preparation of these notes.

PHOTINIA NOTONIANA (Wall.?) leaves from cuneate-lanceolate to oblong, acute, quite entire or with a few inconspicuous scattered teeth: panicles large, very compound; ramifications puberulous: pedicels much shorter than the calyx: cells of the ovary spuriously semi-bilocular: fruit glabrous, 2-seeded.—*W. and A. Prod. p.* 302.

This is a considerable tree, abundantly distributed over the Hills. It flowers during March and April, and when in full flower is a beautiful object, each branch being terminated as here shown, by a large cluster of white, tending to rose coloured, flowers. In June the fruit ripen and then are of a dull redish brown colour. Seeds usually four, each enclosed in its own proper cell ascending enclosed in the succulent calyx, radicle inferior. The fruit possess in a remarkable degree the peculiar sour, austere taste of those of the mountain Ash.

Figures 8, 9, 10 and 11 of this plate are all inverted. The radicle should in all have been inferior, not superior, as shown in the plate.

COTONEASTER.

Flowers often polygamous: calyx turbinate obtusely five toothed: petals short erect: stamens about the length of the teeth of the calyx, styles glabrous, shorter than the stamens carpels 2-3-partially, enclosed in the calyx 2-ovuled. Shrubs with simple entire leaves wholly beneath: corymbs lateral patent, furnished with deciduous subulate bracts: petals small persistent.—*D. C. Prod.* 2—632.

COTONEASTER BUXIFOLIA (Wall. List) shrubby erect, very ramous: leaves oval or subobovate, pointed, glabrous above, tomentose beneath: corymbs few flowered: peduncles and calyx tomentose.

A small erect densely ramous scraggy looking shrub, rather frequent about Ootacamund, also on the roadsides to Kotagherry and Kulhutty, flowering March and April—also very abundant in Orange valley, where I found it in flower in August and September. It rarely attains the height of six feet, is full of little branches forming a dense compact mass of vegetation. The leaves are small, rarely attaining the length of ½ an inch, and little more than half the breadth, glabrous above, clothed beneath with soft white hair; usually oval or tending to obovate, attenuated below, mucronate at the point. Flowers small, white, in little clusters of three or four: calyx tomentose: petals round glabrous withering before they fall: ovary of two carpels hairy, at first scarcely immersed in the calyx; calyx afterwards enlarging and enclosing them. Fruit about the size of a pea, succulent, with a harsh austere taste: seed four, ascending testa bony radicle inferior.

This differs from *C. affinis* to which D. C. referred doubtfully to it, in its erect not procumbent habit, smaller leaves and fewer flowered corymbs.

PYGEUM.

Tube of the calyx cup shaped limb 5-cleft: corolla 5-petaled inserted on the throat of the calyx: stamens 12-13 inserted with the petals; filaments filiform; anthers 2-celled deluscing longitudinally: ovary sessile 1-celled; ovules 2-collateral, pendulous; style terminal stigma dilated: drupe dry transversely oblong subtriform contracted in the middle, one-seeded: seed inverse exalbuminous cotyledons, very thick, radicle very short, superior. Trees with alternate oblong entire leaves often with 2 glands at the base, racemes axillary and lateral, solitary or several, often tomentose, flowers small 1 bractiate. *Endl. gen. plant.*

PYGEUM ACUMINATUM? (Colebr.) "a tree with alternate oblong, acuminate entire, glabrous leaves: racemes axillary: flowers yellowish."—*Polyodontia arborea Blume.*

The specimens from which the drawing was made, were gathered at Kaitee falls in July. I since, in company with Mr. Gardner of Ceylon, found it in great abundance near the Avalanche in fruit, in February. It is a large tree producing a fine spreading umbrageous head, with large ovate acuminate entire glabrous leaves, without glands: solitary glabrous, racemes and slightly hairy calyx tube: ovary hairy with glabrous style and 2-lobed dilated stigma.

The above character is so brief and general that it is impossible to say whether this is Colebrooke's plant, but as it agrees, so far as it goes, I have adopted his name, with a doubt, having nothing further to guide me.

I am uncertain about the species, because it seems to me, had this been the one from which Colebrooke's character was taken, he would have described the flower as apetalous with a 12-lobed calyx limb. In this respect, if the dissection of my figure of *Polyodontia Ceylanica*, No. 256 is correct, and I believe it is, this can scarcely be considered a true congener, as it is represented with distinct calyx and petals, but I have not now the specimens to re-examine. Specimens of a Ceylon species which I have, correspond with this. Should this prove a distinct species, the following character might serve to distinguish it from the other species of the genus.

Arboreous: leaves alternate, oblong, acuminated, entire, glabrous: racemes axillary shorter than the leaves: flowers yellowish: calyx lobes and corolla indistinguishable, clothed with rusty coloured pubescence: filaments attached to the edge of the tube inflexed in æstivation: ovary ventricose, stigma dilated, two lipped, drupe dry friable, transversely oblong, glabrous.

This genus seems imperfectly known, it was first established by Mr. Colebrooke on an Indian plant. Blume afterwards found a species which he described under the name of *Polyodontia arborea*, which Walpers in his "Repertorium," has referred as a synonym to Colebrooke's plant, but I suspect erroneously, if this plant is correctly named. As regards the analysis of the accompanying figure, which was prepared in my absence, I have some misgivings as to its accuracy, a point on which I have not at present the means of satisfying myself.

XXVIII.—MELASTOMACEÆ.

This is a large, and far the most part, a Tropical family, the number of extra-tropical species being small when compared with the great number of equinoctial ones, and those found in the warm latitudes immediately adjoining. Many of the tropical species however possess the transition character assigned to Balsamineæ, that is, they are found in Alpine regions, and only make their appearance during the cool and rainy season of the year, or immediately after the rains are over. Such is the character of the Neilgherry ones, nearly all of which are in their greatest perfection in January and February.

By far the greatest number are natives of America, extending as far south as Brazil, in which country they are numerous. From that continent there are now nearly 1000

known species. Asia and her Islands, hold the next place, the number of species already derived from these regions amounting to about 200, a few only have as yet been obtained from the African continent, and still fewer from New Holland.

In Ceylon they are numerous in proportion to the extent of country where they principally occur, upwards of 20 species having already been obtained from the southern and more elevated districts of that country: that being the tract best examined. And there they are so numerous, that I have no doubt the number will, ere long, under the keen scrutiny of Mr. Gardner, be doubled. In India, so far as yet known, the number of species are, I suspect, fewer than in Ceylon; but the western ghauts where only they can be expected in any considerable number, have not yet been sufficiently examined during the most favourable seasons for finding them. In the plains of the Carnatic and Mysore, where the climate is dry, they are almost unknown, but about Courtallum where during the Southwest Monsoon, the climate is cool and moist, they are more frequent. On the more elevated Alpine regions such as the Pulney Mountains and the Neilgherries, they abound, though the number of species is small. The most productive tracts however of these hills are still imperfectly explored. On the western slopes where the climate is humid and apparently congenial to their constitution, I apprehend they will be found much more numerous than we are yet aware of. This I think from having lately found seven or eight species on the Sisparah Ghaut, about the end of February, the season being at that time so far advanced, that most of them were nearly past flower. Most of these are undescribed in our Prodromus.

When writing that work only 16 Peninsular species were known, these accessions raise the number to about 22, and among those obtained from other quarters now in my collection but not determined, it is probable three or four more may be added, making only 25 or 26, for the whole of the Indian Peninsula; a small proportion of the estimated number of Asiatic species. I have extended these remarks on the geographical distribution of this family, in the hope of their leading to future enquiries on the subject.

The family, as a whole is a very natural one, and marked throughout by so strong a family likeness, that two or three being known, the whole family may generally be recognized at first sight. This family likeness had led DeCandolle to remark of it, that "the family of *Melastomaceæ*, though composed entirely of exotic plants, and established at a period when but few species were known, is so well characterized that no one has ever thought of putting any part of it in any other group, or even introducing into it genera that do not rightly belong to it" (see Lindley's nat. system.) But it is not so easy to distinguish among themselves the genera and species of which it is composed, the closeness of their affinity often rendering this a very difficult process. The genera *Melastoma* and *Osbeckia* afford a striking example of this fact, the distinguishing character being derived from the anthers when in flower, and from the pulpy baccate fruit of the former when in fruit. The fruit of *Osbeckia* is a dry capsule. From both these and from the rest of the family, *Sonerilla* is at once distinguished by its ternary flowers, many of its species have moreover pinnately veined, not ribbed leaves, the latter being the predominant form in the order. This last indeed is one of its distinguishing features, and added to the long beaked anthers opening at the point by pores, leaves scarcely a doubt that any plant in which they meet, belongs to this family. They are further distinguished by the position of the anthers in æstivation, the apex of the filament being bent or folded down, and the anther lodged in a cavity

between the calyx tube and ovary. A nearly similar formation is found in *Memecylon*, which has induced both Meisner and Endlicher following Chamisso, to unite these families, but to my mind injudiciously, as, so far as my acquaintance with them extends, I think they each form distinct and very natural groups, and that their union tends to spoil both. In habit they differ widely, also somewhat in the structure of the flower, by the complete union of the calyx and ovary, in the number and position of the ovules, which are very numerous in *Melastomaceæ*, but in *Memecylon* solitary and pendulous from the apex of the cells of the ovary: and lastly, the cotyledons of Memecylon are spirally convolute, which is wanting in the other. Each of these, as solitary characters, would be of little weight, but taken together, in my opinion, are more than sufficient to outweigh the solitary one derived from the incurved anthers in æstivation, by which alone the two families are sought to be united.

Regarding their properties, nothing of any importance is known—none are unwholesome, while the fruit of several are edible. Those of Melastoma being succulent and dark coloured, stain the mouth black in eating, whence the name which, literally interpreted means black-mouth.

SONERILA.

Calyx tube oblong or somewhat 3-angled, cohering with the ovary with 3-6 longitudinal lines: limb [illegible] the segments deciduous. Petals 3, ovate-lanceolate, acute. Stamens 3: anthers oblong, pointed, straightish, bifid at the base, opening at the apex by two pores; connectivum not produced at the base. Ovary truncated and glabrous at the apex. Style filiform. Stigma obtuse. Capsule turbinate, crowned with the margin of the calyx which is thickened on the inside, 3-celled, 3-valved, the valves opening at the apex only. Seeds cuneate-obovate, sharp and somewhat grooved along one side: hilum at the base.—Herbaceous or suffrutescent usually small plants. Leaves membranous, hairy, opposite, one of them often a little smaller than the other, rarely quite abortive. Peduncles axillary or terminal, few-flowered. Flowers racemose or fascicled, rose-coloured.—*W. and A. Prod. p.* 321.

This genus was founded by Roxburgh for the admission of four undescribed plants known to him. He took the name from a native one given by Rheede, to one he had figured in his Hortus Malabaricus. In 1828, when DeCandolle published the Order in his Prodromus, the genus was so little known, that he was under the necessity of excluding it from the family as one, unknown to him. Fifteen years after, Walpers in his "Repertorium Botanicum," compiled a list of 21 published species, and several have since been discovered. This therefore promises ere long to become a large genus. The three species I have introduced here, are the handsomest I have seen. They seem all to be annuals, except, perhaps, the first, which appears to have a woody stem; but as, of a great number of specimens gathered, the stems of all seemed of this year's growth, I suspect the root only if even that is perennial, and that the stem is annually cut down by the frost.

SONERILA GRANDIFLORA (R. Br.) erect glabrous: leaves elliptic, attenuated at both ends, bristle-serrated, 3-5 nerved at the base: peduncle terminal (always), about the length of the leaves, flattened at the apex, and there bearing a slightly curved raceme of several unilateral large flowers: petals ovate, pointed: style as long as the stamens: stigma simple: capsule glabrous, 3-sided, scarcely the length of the pedicel.—*W. and A. Prod. p.* 322.

A beautiful plant, and, as compared with the other species of the genus, well named. I have only met with it in one station on the Neilgherries, in Long Valley, about mid-way between the Avalanche and Sispara. There it occurs in considerable abundance on the banks of a stream by which the valley is intersected. The flowers are of a deep pink, congregated on the ends of the branches. It is an erect suffruticose plant, from 12 to 18 inches high, the leaves between 2 and 3 inches long and about 1 broad, three to five nerved, the outer pair of nerves often very slender, but in luxuriant plants, such as the one represented, distinctly 5-nerved.

SONERILA SPECIOSA (Zenker) stem erect, subdichotomous at the base, somewhat four-sided: leaves petioled 5-nerved, broadly ovate, acute, mucronately serrated, glabrous; petioles hairy near the apex: peduncles terminal, dichotomous; branches afterwards elongating; flowers secund: calyx and mid rib of the

petals, below, covered with short, rigid, glanduliferous hairs: petals ovate, obtuse, mucronate: style and stamens about equal.

Kaitty waterfalls sparingly. On the hills behind the Avalanche Bungalow in moist soil, near springs, very abundant. In full flower in February. This is a large and beautiful species differing from many of its congeners in its ribbed, not pinnately veinous leaves, an important character which Zenker has overlooked in his definition. When seen in perfection this is a very handsome species, with large pink flowers, rarely more than two or three open at once on each branch of the cyme.

Sonnerila elegans (R. W.) herbaceous, erect, ramous, hairy: leaves petioled, pinninerved, from ovate cordate to cordate, acuminated, serrulate: peduncles terminal, cymosely dichotomous; branches afterwards elongating: flowers numerous, second: calyx pubescent; petals ovate pointed: anthers long beaked: capsule hirsute, conical, 3-sided, crowned with the limb of the calyx: seed hairy.

Sisparah, very abundant all along the road side, in flower and ripe fruit in February. A most conspicuous species, at first a few pale pink flowers open, these are followed successively by others as the branches elongate, until at length each branch is several inches long, covered along the upper edge with a row of capsules and two or three flowers at the extremities: the branches in the mean time spreading horizontally, with a backward tendency slightly approach each other, presenting somewhat the form of the letter V, as shown in the drawing. They often become much longer than here represented, bearing on the same peduncle unopened flowers and ripe capsules.

OSBECKIA.

Calyx-tube ovate, usually covered with stellate bristles or pubescence; limb 4-5 cleft, with appendages between the lobes springing from the outside. Petals 4-5. Stamens 8-10: filaments glabrous: anthers nearly equal and similar to each other, shortly rostrate or very rarely truncated, opening by a single terminal pore; the connectivum with 2 short auricles at the base. Ovary covered with bristles at the apex. Capsule 4-5 celled. Seeds cochleate: hilum orbicular, at the base.—Herbaceous or usually shrubby plants. Flowers terminal. —*W. and A. Prod. p.* 322.

Species of this genus are common to Asia, America, and Africa, but I believe upon the whole predominate in Asia. They are for the most part large flowered handsome plants, and under cultivation would, I should suppose, become very ornamental additions to the flower garden. Several species are natives of the Hills, of these I have selected three of the handsomest to illustrate the genus. *O. Leschenaultiana* is common about Kotagherry and Nedawuttem, flowering August and September. *O. Gardneriana* is equally common about Ootacamund; while *O. Wightiana* is more frequent about Coonoor and Kaitie.

Osbeckia Leschenaultiana (D. C.:) shrubby: branches 4 angled, beset with stiff hairs; leaves sessile, ovate, somewhat acute, approximate, 5-nerved villous on both sides: flowers sessile, bracteated, about 3 together, capitate: calyx tube globose, covered with palmately ciliated short scales; segments 4, lanceolate (D. C.) petals obcordate, bluntly mucronate: stamens 8; anthers clavate, truncated, curved: ovary crowned with a tuft of bristles. (R. W. MSS.)

Frequent about Kotagherry, flowering during the autumnal months. Flowers small, compared with those of most of the other species of the genus, and in proportion to the size of the plant, which often attains a height of between two and three feet. They are nearly white, dashed with crimson spots. It associates with *O. truncata* in its beakless anthers and small flowers, but is in all other respects amply distinct. The flowers in DeCandolle's specimens seem to have been imperfect, as he has not alluded to the petals or stamens.

Osbeckia Gardneriana (R. W.) a large erect ramous shrub, all the young parts clothed with long bristly hairs: leaves sessile, ovate, 3-nerved; usually with two short slender lateral ones near the base, pubescently hairy on both sides: flowers terminal capitate: calyx tube short, campanulate, closely covered with ligulate and, towards the apex, clavate adpressed scales, furnished with numerous long dark red or rusty coloured bristles; limb 5-cleft, divisions linear, lanceolate, obtuse, more than twice the length of the appendages, both covered with bristles: petals 5, orbicular: stamens 10, anthers recurved, corrugated on the inner edge, shortly beaked.

This, which is the largest and most conspicuous species found on the Hills, is very abundant in the woods about Ootacamund, extending westwards as far as Sisparah. In favourable situations it becomes a large bush 8 or 10 feet high, though generally about 4 or 5; flowering in profusion during February and March, when it is indeed a striking object. At first sight it seems very nearly allied to *O. Wightiana*, but a closer inspection shows that they are quite distinct species. The kind of hair with which the leaves of the two species are clothed, is very different; in this they are scattered, long and soft, like rough pubescence, hence I have made use of that term to distinguish them; while in the other they are very dense, stiff and closely adpressed, giving in some lights an almost metalic lustre to their surface—here the leaves are 3-nerved, there 5 to 7—here the scales of the calyx are partly ligulate, there they are capitate; here the bristles with which the calyx is clothed are of a deep rusty brown and very long, while there they are nearly white and comparatively short. And lastly, the flowers are much smaller in this than the other. I have dedicated this noble species to Mr. George Gardner, the Superintendent of the Royal Botanic Garden of Ceylon, as a lasting memorial of the many agreeable hours spent with him in exploring the vegetable treasures of these Hills,

many of which discovered for the first time during that excursion, will embellish this work, and also to my high estimation of his great Botanical attainments.

Osbeckia Wightiana (Benth.) shrubby: branches herbaceous, scabrous with short bristles: leaves nearly sessile, ovate, slightly acute, quite entire, 5-7 nerved; upper side covered with adpressed, somewhat shining hairs; under hirsute on the nerves, and shortly tomentose between them: flowers (large) terminal, at first densely capitate and bractrated, afterwards often solitary: calyx campanulate, densely covered with short adpressed capitate scales, bearing a tuft of long bristles at the apex; segments 5 deciduous; appendages deciduous, covered with bristles: anthers 10, linear-oblong, scarcely beaked: style clavate.—*W. and A. Prod. p.* 323.

This species is rare about Ootacamund; but about Coonoor and Kattie Falls, it is common. It is readily distinguished from the preceding, by the short ridged shining adpressed hairs with which the 5 to 7-nerved leaves are covered, and by the calycine bristles being pearly white, while in it they are a deep brownish red.

XXIX.—MYRTACEÆ.—MYRTLE TRIBE.

This is a family of great extent, and has engaged much of the attention of Botanists in elucidation of its connections, its genera, and towards the discrimination of its numerous species; much however is still required, as up to the present time, it seems a very heterogenous assemblage, and apparently one of the most difficult to define.

It includes some very interesting plants; such as the clove tree, the Jamaica pepper tree or All-spice, the Rose-apple, the Guava, and a host of others; and generally its species are remarkable for their handsome flowers, and the aromatic odour of their foliage when bruised; owing to their containing in numerous little cells, a quantity of an aromatic essential oil, which can be seen collected in transparent vesicles when held between the eye and the light, in the common myrtle they are easily seen.

This is one of the best distinguishing marks of the family. Any one finding a plant with opposite leaves and calyciflorous flowers, that is, the stamens and petals growing from the cup of the calyx, may feel almost certain it belongs to this family if the leaves have transparent dots. Care, however must be taken not to confound them with the Hypericums or the Rutaceous family, which differ in having a superior ovary, while the Myrtles have an inferior one, that is, in other words, the young fruit is seen below the flower.

The dotted leaves though general, are not universal: they are wanting in the guava and some others, and in many, are so minute as to require the aid of a magnifier to see them. In the *Myrtus tomentosa*, they are also wanting, which circumstance induced me carefully to compare this plant with *Myrtus communis*, the type of the genus, when I ascertained, that they could not be associated as true congeners, and that the former must be separated to form the type of a new genus. Salisbury long ago suggested their separation, and DeCandolle has partially accomplished it, by placing this along with *Myrtus spectabilis*, (the type of another genus,) in a distinct section, under the name of *Rhodomyrtus*, with the character, "*Flores rosei. Semena compresso-plana in loculis biseriata.*" This name I therefore adopt for the genus. It is allied on the one hand to Myrtus, by its 3-celled ovary and osseous seed, but differs in their simple double series compressed form, horizontal position, even in the ovary, and in habit. On the other, it approaches the Guava (Psidium,) in habit, its impunctate leaves and succulent fruit; but differs in its 3-celled ovary, its flattened seed, not nidulating in pulp, and its 3-nerved leaves. It seems to form the transition from the one to the other, agreeing with neither, but largely partaking of the characters of both.

The order is very widely distributed, but greatly predominates within the tropics or in the warm latitudes immediately adjoining on either side. Numerous species are natives

of America, Asia, and New Holland, fewer have yet been found in Africa; but it has not been so well explored. The number of species referred to this order, I estimate by a rough calculation at from 1000 to 1200, but I think it probable my estimate is under the true number, as there are 70 genera, and some including upwards of 100 species, one *Eugenia* above 300. One species only is a native of Europe, that from which the family takes its name *Myrtus communis*, and that is confined to the southern latitudes.

Such being the case, it is natural to suppose, that in a climate partaking so largely of the European character as this does, that the number of species should be small. And this is the case, four only being found on the higher ranges: while as we descend to the plains, on all sides, the numbers increase. Those however that do occur here are very abundant, and three of the four, stately trees; the fourth *Myrtus tomentosa*, or, as I now propose to designate it, *Rhodomyrtus tomentosus* is generally a shrub, though sometimes it attains almost arboreous dimensions.

The relations of this order with its neighbours are sufficiently extensive and varied, and as it now stands, being loosely defined and very polymorphous, affinities with a great number can be easily traced. The essential character of the order is, an adherent ovary: stamens usually indefinate not induplicate in æstivation, (that is the filaments are not folded on themselves as in *Melastomaceæ*,) leaves pellucidly punctuate. Exclude the last clause —leaves pellucidly punctuate—and then the following may be included under the rest of the definition—*Pomaceæ, Combretaceæ, Alangieæ, Rhizophoreæ, Philadelpheæ*, and *Onagrariæ*.

From this it would appear the characters of Myrtaceæ are rather of a negative than positive kind, and that to discover a Myrtaceous plant, we must first ascertain that it does not belong to any of the above orders, and then we may infer that it belongs to this. Ordinal distinctions taken from the ovary and fruit, can have no place here, for among the sections and genera we find nearly all kinds. The flowers and leaves alone supply the ordinal characters, the ovaries and fruit sectional and generic ones.

The Pomegranate was long associated with this family. Don removed it as the type of a new order, in this he has been followed by most Botanists: Endlicher has, however, restored it to its old place, but I think incorrectly, as it assuredly is not a Myrtaceous plant. The late Mr. Griffith referred it to *Lythrariæ*, and I now think he is the only Botanist who really understood its true structure and affinities.

I have already alluded to some of the economical applications of the species of this family, one rather curious property remains to be noticed; namely, that the juice of the *Rhodomyrtus*, when simply boiled for some time yields without the aid of sugar, a jelly of as firm a consistence as animal jelly, a circumstance, I believe, of rare occurrence among vegetable juices.

RHODOMYRTUS—R. W.—MYRTUS—Sect. II—DC.

Calyx tube conical, limb 5-lobed, æstivation quincuncial: petals 5, æstivation imbricated: stamens indefinite: ovary 3-celled: ovules in a double series superposed, horizontally compressed, incurved and reniform: seeds like the ovules subreniform, compressed, horizontal, 2 series, testa bony: embryo terete the shape of the seed.

Shrubs or small trees with opposite, oval, 3-nerved, coriaceous impunctate leaves, at first pubescent, afterwards subglabrous above, villous or tomentose beneath, peduncles axillary, 1-3-flowered with 2

bracteoles at the apex: calyx and outer surface of the petals tomentose, calyx lobes suborbicular quincuncially embracating on the margins: petals subelliptic, reddish within, clothed exteriorly with white adpressed pubescence: stamens very numerous, filaments slender purplish, anthers small: style as long as the stamens, tapering upwards: stigma capitate: berry globose, tomentose, soft succulent and yellowish when ripe, crowned with the persistent lobes of the calyx.

As already stated, this genus occupies a place intermediate between Psidium (Guava) and Myrtus; it has much of the habit of the former, but differs widely in its ovary. In habit it is widely distinct from Myrtus communis, the only genuine species I know, and also in its ovary the cells, having invariably 2 rows of collateral ovules, while in Myrtus there are four. In the form of the seed they also differ, in this they are always compressed and horizontal; in that thick approaching to globose on the back, very few (at least in this country) coming to maturity, while in this nearly all do so.

RHODOMYRTUS TOMENTOSUS (R. W.) *Myrtus tomentosa*, Aiton Hort, Kew and others. Myrtus (Rhodomyrtus) tomentosa.—*DC. Prod.* 3, *p.* 240.

Very common on every part of the Hills, where it is generally known as the "Hill gooseberry," a name far from inappropriate, as it a good deal resembles that fruit, and when ripe is very palatable. The jelly obtained from them is much used, as it much resembles apple jelly both in taste and appearance.

The plant equally abounds in some parts of Ceylon, or one very like, in Malacca, China, &c., in all of which places the fruit eat.

EUGENIA.

Calyx tube short, nearly globose, or variously elongated; limb 4 or 5 cleft. Petals 4 or some multiple of that number, 8-12—rarely five. Stamens numerous, distinct. Ovary 2-celled, with numerous ovules attached to axillary placentæ. Berry crowned by the segments of the calyx, one, or rarely two-celled. Seeds one or two large: cotyledons thick and fleshy, partially or completely combined into one mass with the radicle: radicle very short scarcely distinguishable.

Trees or shrubs with opposite, entire, pellucid-dotted leaves and axillary or terminal, solitary or aggregated peduncles either simple and one-flowered, or racemose, cymose, or panicled. Flowers small and very numerous, or large conspicuous and comparatively few, usually white but sometimes coloured. Fruit a succulent few seeded berry, white, pale reddish, or deep purple coloured, usually sweetish, sometimes combined with a peculiar rose flavour, (as the rose apple,) at others rough and astringent.

This is a very extensive and complex genus, but at the same time, when properly understood a very distinct and natural one, essentially resting on points of structure not liable to change, the number, namely, of cells, of the ovary and peculiar formation of seed.

When DeCandolle undertook its elaboration for the third volume of his Prodromus, he seems to have felt the task a difficult one, owing to the ever varying forms its numerous species present. Here we find almost side by side, small shrubs and large trees inflorescence of nearly every imaginable form, flowers the most minute and clustered on one species, on another large, showy and distinct, usually white, but as in the case *Eug.* (*Jambosa*) *Malaccensis*, deep crimson. On more closely analysing the parts of the flower, we find some with the calyx tube very short, almost inconspicuous, in others forming a little ball under the flower, and in others lengthened out into a long cylinder like tube exceeding an inch in length. The limb in like manner is either deeply lobed, merely toothed, or cup-shaped, and quite entire on the margin. The petals for the most part expand in the usual form, but in the subgenera *Syzygium* and *Caryophyllus*, they are, in the flower-bud, usually so closely adpressed to each other that they never open, but are forced off all in one, like a lid, by the progressive enlargement of the enclosed stamens.

To several of these secondary variations, notwithstanding the uniformity of the more essential organisation, he attached generic value, and divided the genus into four or five genera. *Eugenia* had the limb of the calyx cleft down to the ovary. *Jambosa* had a turbinate calyx tube attenuated at the base, and the limb 4-cleft. *Arnæna*, a turbinate calyx tube, and the limb entire. *Caryophyllus*, a cylindrical calyx tube, 4-parted limb, and four cohering petals; and lastly, *Syzygium* had an obovate calyx tube, subentire limb and concreted petals separating like a lid.

While engaged in preparing the article *Myrtaceæ*, for my Illustrations of Indian Botany, the futility of such characters in the formation of genera, was rendered strikingly obvious by two or three species in my herbarium, which neither associated with any of these, nor would they unite with each other to form one additional genus. Each required to be elevated to the rank of a genus resting on characters equally artificial with any of those given above. This circumstance induced me to examine with much care, the characters of all these genera, as given by DeCandolle, which led to the conviction that they are, at best, all mere sections or subgenera of one vast and very natural genus, differing from each other more or less in habit, and in the form of parts of secondary value in the formation of genera, but corresponding in those of really essential importance —the position, structure and contents of the ovary; structure of the seed, and position of the radicle. In these points they all agree, and to the same extent differ from the rest of the family of *Myrtaceæ*. This last fact had much influence in inducing me to re-unite all the above named genera into one comprehensive whole.

The genus thus formed is one of great extent, including probably not fewer than 400 species. These are distributed generally over the tropics and warmer latitudes on either side. America, Asia, Africa and New Holland, all claim indigenous species, but they most predominate in America, and are very sparingly distributed in Australia. Three species of the subgenus Syzygium, present themselves in the woods about Ootacamund, and one of these occurs on the top of Dodabet, a fourth is met with on the lower levels of Coonoor and Kotagherry, but rarely ascending above that level. On the Western slopes *E. Mesrosii*, referable to the subgenus *Jambosa*, occurs some distance below Sisparah.

The following characters of the subgenera of this extensive genus, I extract from my illustrations slightly modified :—

1. Eu Eugenia. Calyx tube globose; limb 4-parted down to the ovary. Pedicels axillary, one flowered.

2. Jambosa. Calyx tube turbinate rarely cylindrical; limb produced considerably beyond the ovary, cup-shaped, margin 4-cleft. Cymes lateral or terminal, flowers usually large: fruit often edible.

3. Caryophyllus. Calyx tube cylindrical, limb deeply 4-cleft. Cymes terminal, somewhat corymbose. Flowers highly aromatic.

4. Acmena. Calyx tube long clavate, much produced beyond the cell of the ovary; limb truncated entire, or repandly 4-5-lobed. Flowers numerous, inflorescence variously racemose or corymbose, petals 4-5 or numerous—8-12—free or cohering.

5. Syzygium. Calyx tube short, contracted, pedicel-like; limb dilated cup-shaped, much produced beyond the ovary, margin truncated, or repandly lobed. Cymes corymbose, flowers small, petals usually cohering.

Eugenia (S) Arnottiana (R. W. Ill. Ind. Bot. *Syzygium densiflorum* Wall.) leaves elliptic, oblong, acuminate, folded, coriaceous, dotted: cyme dense, corymbose; peduncles lateral, general and partial stout, the partial ones short and bearing at the apex an umbel of 8-12 almost sessile flowers subtended by oblong-linear caducous bracteas; calyx shortly tubinate; limb cup-shaped, shortly and bluntly 4-toothed or lobed: petals expanded before falling off.—*W. and A. Prod. p.* 329.

Abundant in the jungles about Ootacamund, and generally met with in the woods on the higher hills. It is a beautiful tree, generally of low growth, with wide spreading branches forming a fine umbrageous head. It is in its greatest perfection in February and March, when covered with thousands of large clusters of flowers. In May and June it is covered with myriads of its oblong dark purple succulent austere tasted fruit. The Cotyledons are thick and fleshy placed horizontally one above the other with a small radicle between.

The fruit, which is sweetish and austere, is eat to a considerable extent by the natives, though, owing to its astringency, by no means palatable.

Eugenia (S) Calophyllifolia (R. W. Illust. Ind. Bot.) arborious, ramuli, 4-sided: leaves approximated towards the ends of the branchlets, from oval, very obtuse, to obovate-orbicular, coriaceous; veinless above, penninerved beneath, when dry, slightly revolute on the margin, not dotted: cymes terminal, corymbose, short peduncled, many flowered: calyx repandly 4-toothed: petals 4, orbicular, separating as one: berries oval, oblong, succulent, dark purple when ripe.

A low spreading tree, very abundant in the woods about Ootacamund. The flowers are exceedingly numerous but make no show, so few in each cluster opening at the same time. The tree itself however is a very beautiful one, with a fine round umbrageous head. It is to be met with in flower at all seasons, but is in greatest perfection in March and April. The fruit is so like those of *E. Arnottiana*, that the same description will serve for both.

XXX.—PASSIFLORIÆ—PASSION FLOWER TRIBE.

In Indian Botany this is a family, of very minor importance as so very few Asiatic species belong to it. There is but one native species of Passion Flower in the Indian Peninsula, and, so far as yet known, only found on the Hills. A second is found on the Hymalayas, and one or two in the Eastern Islands. All the other species, nearly 150 in number, are with the exception of a few African ones, natives of America. The few that are found in India, are however interesting as forming so many links of the chain connecting the floras of the two countries. It was principally under this point of view, that I was induced to introduce the Neilgherry Passion Flower into this collection, as I had already published it in my Icones, and there is certainly nothing very striking in its appearance to entitle it to the distinction of being published a second time, as it is in truth, about the plainest looking species of this curious and generally handsome genus, I have seen.

It is met with in considerable abundance on the Hills growing in woods, and climbing extensively over the trees. The flower though plain, when looked at as a whole, owing to the want of the bright colours which many of its congeners present, is by no means wanting as regards the perfection of its parts when more closely examined. Here we find a double series of floral leaves or a calyx and corolla, while many have the outer series only. Here we have a double series of filamentous processes, the same as in the most perfect, and lastly there is within these, a membranous tissue plaited with the greatest nicety, surrounding the base of the pedicel of the ovary, properly to appreciate the beauties of which the microscope is required. Within that, borne on an elevated torus, or pedicel, embraced by the base of the stamens, is the ovary or embryo fruit, surmounted by three diverging capitate styles. Such is the structure of the Neilgherry passion flower.

Considerable difference of opinion exists among Botanists, regarding the nature of the parts of the flower. Some maintain that it has no corolla even in those instances where, like the present, there is a double series of floral leaves, and therefore call them all sepals, though the interior series are petaloid in their appearance, colouring and texture, and say the crown or filamentous processes rise from the cup of the calyx. Jussieu, DeCandolle, Endlicher, and Meisner all adopt that view. Lindley on the other hand, maintains that the inner series are true petals, and that their crown is metamorphosed petals. Dr. Arnott and myself considered the second series petals, but viewed the crown as more properly belonging to the stamens.

When preparing my account of the order for the illustration of Indian Botany, I was induced to take a view somewhat different from either, considering both series of floral leaves sepals and the crown, as modified corolla. A very careful examination of this species has induced me to adopt Dr. Lindley's opinion, as being the more correct of the three, as I think it can be shown that both the inner series of floral leaves and the crown, arise from the exterior edge of a disk, lining the throat of the calyx, while the stamens spring from the interior edge, proving that both the crown and inner series of leaves belong to the same series of parts and are equally distinct from both calyx and stamens. Lindley however seems subsequently to have relinquished the idea of the crown being metamorphosed petals, and in his elements of Botany, (a more recent publication than his natural system,) at page

203, defines his " Alliance *Passionales*," " Flowers with a ring or coronet of sterile stamens," a view which my present examination does not enable me to adopt.*

This discussion is introduced to show how gradual the transition of parts sometimes is, and that in such cases much discrimination is required to enable the investigator of natural objects, to call parts by their right names.

Regarding the properties of the family almost nothing seems to be known. The fruit of some is edible and is said to be " fragrant, juicy, cooling and pleasant."

PASSIFLORA PASSION FLOWER.

Flowers bisexual. Calyx-tube very short. Corona composed of numerous filaments in several rows. Anthers reflexed. Berry stalked, usually pulpy, rarely somewhat membranaceous.—*W. and A. Prod. p.* 352.

This genus as already remarked, is one of great extent, though so sparingly found in India. The species are either herbaceous annuals or climbing shrubs, admirably adapted for arbours, as well on account of their rapidity of growth, as on account of the profusion and splendor of their flowers, whence it is with great justice said, " Passion flowers are the pride of South America and the West Indies, where the woods are filled with their species, which climb about from tree to tree, bearing at one time flowers of the most striking beauty, and of so singular an appearance, that the zealous Catholics who discovered them, adapted Christian traditions to those inhabitants of the South American Wilderness : and at other times fruit, tempting to the eye and refreshing to the palate."—Lindley. The Indian plant cannot compete in richness of colouring, with those forest jems of the Western World, but still it does not merit the total neglect with which it is treated by the European sojourners on these Hills. I therefore hope this notice, by directing attention to the fact of our having a native Passion flower among us, will also have the effect of bringing it into vogue.

PASSIFLORA LESCHENAULTII (DC. :) climbing : leaves half-orbicular, rounded at the base, somewhat truncated and 3-cuspidate at the apex, pubescent on the under side, but particularly so on the nerves, without glands : petioles with two glands about their middle : tendrils simple : peduncles in pairs from the same axils as the tendrils, simple, 1-flowered : calyx without an involucre ; petals 5.—*DC. Prod.* 3. *p.* 326 ; *Wall. ! L. n.* 1231 ; *Wight ! cat. n.* 1154.—Neilgherries.—*W. and A. Prod. p.* 352.

A rather common extensively climbing shrub, growing in woods about Ootacamund, but more abundantly and in greater perfection at the lower levels of Kotagherry, Coonoor, the Avalanche, &c. The flowers are small compared to some of the finer species, but larger than several I have seen in cultivation, and much thought of too ; the colours though not bright are yet so vivid as to bear close inspection though little conspicuous at a distance, a kind of modesty which I apprehend as tended to keep them in the back ground.

It is generally in flower at all seasons, but most abundantly during the rainy ones. *I* have not heard of the fruit having been tried, nor have I ever had the curiosity to taste it myself. It is about the size of a pigeon's egg, purple when ripe.

XXXI.—CRASSULACEÆ—STONECROP TRIBE.

This is a family of succulent plants, of which a good many are natives of Europe, but many more of the Cape of Good Hope, where succulent plants of all kinds are most abundant. In India they are so very rare, that our peninsular Flora only includes 5 species,

* When this sheet was passing through the press I received some unpublished papers of the late Mr. Griffith, who has most elaborately dissected and delineated the progressive development of the flower of *P. kermesina*, from its earliest stages, and concludes from his examination, that the coronal processes are neither metamorphosed petals nor stamens. He says, " the processes or cilia are ulterior, neither (them nor the tube of the calyx) appearing until the ovules have commenced being coated, and the anthers so far perfected as to present parent cells." His dissections further show that both the stamens and petals are formed before any trace of the coronet is perceptible. He thence infers, " that their late appearance and irregularity, connected with their outside station, is a proof that they are not *staminal*, but mere cellular processes from the tube of the calyx." Lastly he remarks, " The processes are of late appearance, the sepals being hooded, the stamens sulcate down the middle, the petals rather larger, the pistillum a three lobed disc before any signs of processes." —See Griffith's posthumous papers now publishing in Supt. to the Calcutta Journal of Nat. History.

and one of these a doubtful native. The one here delineated is, however, very common on the Hills, and has moreover been generally introduced into the gardens, probably more on account of the facility of propagation than any thing else, for indeed, nothing can be easier to propagate than this plant. In habit this, the only Neilgherry plant of the order, is perennial, very succulent, attains a considerable size, and during the earlier months of the year, is covered with large clusters of yellow flowers which continue appearing in succession, for two or three months. Towards May they have pretty generally disappeared, but plants are still to be had even at that advanced season in flower.

This, in common with the whole family, is distinguished by the exact symmetry of its flowers; 4 sepals, 4 petals, 4 carpels, and 8 stamens. These numbers vary in different genera, but the proportions remain the same, and by their regular alternation, this family is readily distinguished from all its neighbours. DeCandolle's classification of this family does not appear to me by any means a satisfactory one, and has not been adopted by either Lindley or Endlicher. *Saxifragæ*, a family as yet undiscovered on these Hills, seems clearly its nearest relative, but from which it is easily distinguished by the number of carpels, which in this equals the number of petals and are free to the base, while in Saxifragæ, two is the number of carpels with usually 5 petals. There is also a difference in the placentation worthy of notice in determining affinities.

I have never heard of any useful application to which this plant has been turned, in Europe the leaves of the Houseleek are esteemed for their refrigerent properties and in my younger days I was familiar with it under the name of, "Healing leaf," and thought it a sovereign remedy for all manner of external sores or injuries. Some of the stonecrops are very acrid.

KALANCHOE.

Calyx 4-partite; the sepals scarcely combined at the base, narrow acute, somewhat divaricate. Corolla hypocrateriform; tube cylindrical: limb spreading 4-partite. Stamens 8, attached to the tube of the corolla at the base. Scales 4, linear. Carpels 4. Styles filiform.—Suffruticose fleshy plants. Leaves opposite, irregularly pinnatifid or ovate, usually toothed, thick. Cymes panicled, lax. Flowers yellow, or rarely reddish or whitish.—*W. and A. Prod. p.* 350.

This, tho' a small genus as respects the number of species, (about 16) but makes up by the extent of ground they are spread over. India, from the Hymalayas to Cape Comorin, Ceylon, Moluccas, China, Arabia, Egypt, Sierra Leone, Cape of Good Hope and Brazil, all claim indigenous species. Of the 16, four belong to the Indian Peninsula, and are all to a certain extent, variable in their forms to such an extent, as occasionally to render discrimination very difficult.

KALANCHOE GRANULIFLORA (Wall.:) glabrous: leaves broadly obovate, crenated, upper ones obtuse: cyme corymbose, lax: sepals oblong, acute: segments of the corolla oval, bluntish, with a short hooked mucronate point.—*Wall.! L. n.* 7226; *Wight! cat. n.* 1174.—K. Wightiana, *Wall.! L. n.* 7225.—Dindygull hills, at an elevation of 3000 feet. Neilgherries. —*W. and A. Prod. p.* 359.

This plant usually occurs in rocky places, and when in the neighbourhood of springs, often attains a large size; its yielding succulent branches bending under the weight of their numerous large succulent leaves. Leaves roundish obovate, crenated on the margin, of a bluish green or glaucous colour; the upper ones frequently tinged with red and traversed with deeper coloured veins: cymes terminal corymbose, furnished with conspicuous ovate or suborbicular bracts at each division, flowers large quaternary with 8 stamens, rising from the tube of the corolla, scarcely exserted, anthers oblong, furnished with a minute capitulate appendage: 4 linear scales within, opposite the petals: pistils 4, slightly adherent in the centre, each terminating in a slender filiform capitate style, ovary with very numerous minute ovules attached to an elongated central placenta: fruit somewhat globose, but rarely attains maturity.

XXXII.—UMBELLIFERÆ.

This is a large family, very extra-tropical in its habits, and peculiar in its properties. On the plains of India they are almost unknown, but on the higher hills they are not by any means uncommon either as to the number, or the frequency of individual species. In Europe, however, their numbers are out of all proportion greater, here we have at the utmost some 15 or 20 species distributed over an area of probably 1000 square miles; there, in autumn, walking across a meadow, of perhaps less than 5 acres in extent, as many may often be found.

In its properties this family is very remarkable. The seed, or more properly fruit of nearly the whole are aromatic and carminative, not even excepting those of the most poisonous; while the vegetation of all is suspicious and ought to be used with great care until qualified by culture, or ascertained by experience to be innocuous. The Hemlock and Fools Parsley, both very poisonous plants, are members of this family with many others nearly as bad; but so are the true Parsley, Celery, Carrots, Parsnips, Samphire and many others that are in daily use as wholesome articles of food. Notwithstanding this medley of virulent poisons, medicinal virtues, and wholesome properties, the whole family viewed Botanically, is one of the most natural of the vegetable kingdom, and the most uniform in the structure of its flowers and fruit. An inferior, nearly entire or 5-toothed, calyx, 5 petals, 5 stamens, a 2-celled ovary and fruit with 2 pendulous albuminous seed, are points of structure common to the whole order: generally they are herbaceous with hollow stems, sheathing leaves, and umbelled inflorescence. This last varies as in the case of Hydrocotyle, and some others where the flowers are capitate.

Owing to this uniformity of the structure of the flowers, fruit and inflorescence, this has proved one of the most difficult families to subdivide and group into tribes and genera; and these subdivisions, as now limited, for the most part rest on characters so minute, that even skilful Botanists sometimes find it most difficult to make them out. Such being the case, it has followed as a natural consequence, that various attempts have been made to distribute them in such a way as to facilitate their recognition, but hitherto with indifferent success. That given by DeCandolle, the one followed by us in the peninsular flora, is that now generally adopted; and those wishing information regarding it, may refer either to that work, or to my Illustrations in which its principles are explained, as it would be out of place in this work to undertake the explanation of such a complex arrangement.

As stated above, this, in its economical relations, is an important family; some valuable articles of food are obtained from it, such as the Carrot, Parsnip, Celery, Parsley: as medicine, the aromatic properties of the seed of many render them valuable, as warm, stimulating, carminatives; while the leaves of the Hemlock, used with judgment, are in some forms of disease a most powerful remedy, but unfortunately uncertain in its operation; apparently owing to its properties varying with the age at which the plant is gathered, and also according to the season. Several others are virulently poisonous, and are often destructive to cattle to a great extent, especially in spring. None of those found on the Hills are referable to this last class. I do not recollect any having been cultivated for ornamental purposes.

I refrain from any remarks on the affinities of this order for the very simple reason, that I do not myself understand them. There is nothing else like it in the vegetable kingdom. The Vine and the Ivy have each points by which they approach them, especially in their sheathing leaves and albuminous seed; *Ranunculaceæ* also agree to the same extent and are therefore relations, but somewhat distant; the same may be said of the Spermacoceous section of *Rubiaceæ*, but still all are widely distinct. Ranunculaceæ is, perhaps, that which approaches the nearest in some points, and *Araliaceæ* in others.

HYDROCOTYLE.

Calyx-tube slightly compressed; limb with the margin obsolete. Petals ovate, entire, acute, spreading, their apex straight. Fruit laterally compressed and flattened. Mericarps without vittæ: primary ridges 3, filiform, the dorsal and lateral ones often obsolete, the intermediate ones enlarged. Seed carinately compressed.—Herbaceous or rarely suffrutescent plants, usually slender and aquatic. Umbels simple. Involucre few-leaved. Flowers sessile or pedicelled, whitish.—*W. and A. Prod. p.* 366.

The plants of this genus as the name implies, generally frequent low, wet or marshy grounds, and where they do occur are generally very abundant. On the Hills they are frequent in damp shady woods. Four species are indigenous; in them, two frequenting the open grounds, and two more shady woods. They are procumbent straggling plants, the most erect of the set being the one I have selected for representation. It grows with great luxuriance in dark shady woods, in low, wet soil. In such woods about Pycarah and the Avalanche, I have often seen it; I do not, however, recollect finding it about Ootacamund, though I dare say it is also to be found in the woods here.

HYDROCOTYLE POLYCEPHALA (W. and A.:) stems rooting, scabrous or nearly glabrous; branches petioles and peduncles, and the leaves sparingly on both sides, scabrous from short stout hairs: leaves attached by the margin, orbicular-reniform, 7-lobed; lobes scarcely acute, coarsely crenated: peduncles hoary, numerous (6-18) and umbellate in the axil of the uppermost shortly petioled leaf, almost as long as the leaf: flowers all fertile, numerous (20-30 together), at first capitate and almost sessile, afterwards (in fruit) on short glabrous somewhat permanent pedicels: fruit didymous, slightly [illegible] on each side, smooth and flat between the ribs.—*W. and A. Prod. p.* 366.

Frequent in low-lying woods in rich moist soil; in such situations very luxuriant, completely covering large patches of ground; I have found it in many and distant stations in similar situations, both on the Continent and Ceylon. The specimen figured was found at Hullikul, on Mr. Lascelles' estate, where it grew in great abundance in a wood adjoining his Coffee plantation.

SANICULA.

Calyx-tube echinate; its lobes slightly leafy, persistent. Petals erect, connivent, obovate, with long inflected points. Fruit somewhat globose, terete, not dividing spontaneously. Mericarps densely clothed with hooked prickles, without ridges, with many vittæ. Carpophore indistinct. Seeds semiglobose.—Herbaceous perennial plants. Radicle leaves petioled, palmately lobed; the lobes cuneate, incise and toothed towards the apex. Stem naked or sparingly leafy. General umbel with few leaves; leaflets of the involucre few and often lobed: partial one of several rays; the leaflets of the involucel several and entire. Flowers in the same umbel, male, female, or bisexual.—*W. and A. Prod. p.* 367.

This, like the last, is the only genus of the tribe to which it belongs, found in this part of India. I have introduced it here partly on that account, but principally to show a sport of nature by presenting a plant whose general appearance is so unlike that of other umbelliferous plants, that one, not having a practical acquaintance with the family, might find much difficulty in finding its place in the system of vegetables. It is very abundant in all the woods about Ootacamund and Dodabet, during the rainy season.

SANICULA ELATA (Ham.:) stem dichotomous at the apex: leaves 3-partite or ternate, glabrous: segments sessile, ovate, acute, lobed and serrated, cuneate at the base, the lateral ones often bipartite: umbels usually 3-fid, few flowered: flowers polygamous, the males pedicelled.—*W. and A. Prod. p.* 367.

An erect growing herbaceous plant, common in almost every wood about Ootacamund, flowering during the rainy season. It often attains a large size, three or four feet in height.

PIMPINELLA.

Margin of the calyx obsolete. Petals obovate, emarginate, with the point long and inflexed. Fruit contracted laterally, ovate. Stylopodium cushion-shaped. Styles generally inflexed, sometimes straight, somewhat capitate at the apex. Mericarps with 5 equal filiform ridges, the lateral ones marginal. Interstices with many vittæ, Carpophore bifid. Seed gibbous-convex, flattish in front.—Herbaceous plants with simple roots. Radical leaves either pinnated, or entire: stem leaves more finely divided. Umbels general and partial with many rays, without involucres or involucels, or very rarely with them. Petals white, more rarely reddish or yellow.—*W. and A. Prod. p.* 368.

There are only two species of this genus natives of the Hills; one having an involucrum, or ray of subulate leaves round the base of the umbel, the other without. The one here represented is the one with naked umbels, a mark by which it is easily distinguished from the other. It is very common in the pastures on the slopes of the Hills all about Ootacamund, and readily recognized by its umbels of small white flowers, and two or three round radical leaves lying flat on the ground.

PIMPINELLA LESCHENAULTII (DC.:) perennial: stem slightly branched, glabrous or minutely pubescent: radical leaves petioled, orbicular, cordate, entire, toothed, firm and hard, many nerved at the base, glabrous on the upper side, pubescent on the under; cauline ones few, divided, small and almost reduced to the sheaths: umbel with 5-10 pubescent rays: partial ones with many rays: involucres and involucels wanting: style diverging: fruit ovate-acuminated glabrous.—*W. and A. Prod. p.* 369.

A low herbaceous plant seldom exceeding 12 or 15 inches in height. It is generally distributed over the higher ranges of the hills in dry pastures, flowering during the rainy season. From the naked exposed situations in which it usually grows, though in itself little striking, it becomes very conspicuous. The roots are perennial and strike deep into the soil.

BUPLEURUM.

Margin of the calyx obsolete. Petals roundish, entire, with the closely involute point broad and retuse. Fruit laterally compressed or somewhat didymous, crowned with the depressed stylopodium. Ridges of the mericarps 5, equal, either winged, sharp, filiform, or obsolete: the lateral ones marginal. Interstices with or without vittæ, smooth or granulated. Seed teretely convex, flattish in front.—Herbaceous or shrubby glabrous plants. Leaves rarely divided, usually from the abortion of the limb and dilatation of the petiole changed into phyllodia with quite entire margins. Umbels compound. Involucres various. Flowers yellow.

Of this genus, including in all about 70 species, four are found on the Hills. They are remarkable in the family for their simple undivided leaves, a mark by which the genus is generally much more readily distinguished than by those taken from the flowers and fruit. The one here represented is by far the most common and most conspicuous from its size, and very numerous umbels of small yellow flowers with which it is covered. All along the roads from both Kotagherry and Coonoor, it abounds, often attaining a height when supported by bushes among which it grows, of seven or eight feet, forming a strong contrast with another found in open pasture grounds which rarely exceeds as many inches. A third species I have found in several places of much larger growth, having stems several inches in circumference, and the lower leaves of the stems sometimes 7 or 8 inches long and about 1½ broad. That species *B. plantaginifolium.* R. W. Icones.—Occurs in woods on Elk Hill, at the bottom of Kaitic Falls, and on Snowdown.

BUPLEURUM RAMOSISSIMUM (W. and A.:) perennial, diffuse and much branched, leaves oblong-linear, with a long mucro, narrowed towards the base, amplexicaul, 5-9 nerved, between coriaceous and membranaceous: general umbels with 5-8 rays; partial with 6-12 flowers: leaflets of the involucre and involucel about 5, oblong-linear, mucronate; the former 2-3 times shorter than the rays; the latter rather longer than the flowers, shorter than the fruit: fruit about a half longer than the pedicels, strongly ribbed; interstices with 1-2 vittæ.—*W. and A. Prod. p.* 370.

A very large ramous diffuse species, very common on the Hills, generally found growing among bushes in moist soil, usually from 4 to 6 feet high, but often greatly exceeding that size—Flowering during the rainy season. The flowers are small yellow,

the fruit elongated, somewhat curved like Caraway seed, when ripe marked with strong longitudinal ribs. It is well named *ramosissimum*, but of *mucronatum*, seems equally appropriate, and after comparing many specimens in all states and forms, I am now satisfied that one of these [illegible] must be reduced. *B. virgatum* seems also too n[illegible] to these.

PASTINACA.

Margin of the calyx obsolete or minutely toothed. Petals roundish, entire, involute, the involute part broad and retuse. Fruit flat-compressed dorsally, surrounded by a dilated flattened margin. Mericarps with very slender ridges; the dorsal and 2 intermediate ones equidistant, the lateral contiguous to the dilated margin. Vittæ linear, scarcely shorter than the ridges, solitary in each interstice, 2 or more on the commissura. Carpophore bipartite. Seed flattened.—Herbaceous plants with a fusiform and often fleshy root. Leaves pinnated, the segments toothed, cut or lobed. Umbel compound. Involucre and involucel wanting or few-leaved. Flowers usually yellow.—*W. and A. Prod.* p. 372.

The well known Parsnip is a member of this genus. It is one of very old [illegible] originally established by Tournifort. Since his time another genus has been formed and adopted by all Botanists, from Linnæus downwards, under the name of *Heracleum*, which, however, so far as I can discover, only differs in one point, the form of the petals. In this they are said to be roundish, entire, involute, the involute part round and retuse—while in the other they are said to be obovate, emarginate, with the point inflexed, the exterior ones often larger, spreading and bifid. To my mind these distinctions are too slight and indefinite to merit the importance assigned to them, at least as regards the Indian species. Under this impression, I have taken the liberty of uniting the Indian *Heracleums* with *Pastinaca*, and now publish the *H. rigens* of our Prodromus as a *Pastinaca*, by which two very artificial genera are united into one very natural one. Of the united genera there are several species on the Hills, all distinguished by their coarse foliage, and more or less compressed winged seed. So long as they were separate I always found it exceedingly difficult to tell one genus from the other, united they are generically easily recognized, though the species are not always quite so easily made out. They are all common during the rainy season, but disappear after having produced their seed. I republish from my Icones No. 1010, the following brief remarks regarding the union of the two genera. Being unable to discover any characters, by which these species and several others in my collection, may be distinguished generically from *Pastinaca*, the older genus of the two, I have been induced to refer them all to that genus in preference to retaining both it and *Heracleum* in the Indian Flora. It is my impression that there is no difference between the two genera, but I leave that for those who have better means of determining the point, to decide. So far as written characters go there is no difference, but there may be in habit, with which I am unacquainted.

PASTINACA RIGENS (R. W. *Heracleum rigens* Wall D. C. W. and A.) stems slightly branched, furrowed, pubescent or hirsute: leaves ternate; divisions roundish, somewhat cordate at the base, toothed, upper side more or less scabrous with short hairs, under densely pubescent or tomentose, lateral ones on a short, terminal one on a long petiole, the latter bluntly 3-lobed or ternate; leaflets of the involucel ovate: petals equal: fruit ovate; vittæ on the back linear, much shorter than the fruit, the lateral ones in pairs, and close to the intermediate ridges: vittæ on the commissura 4, acute, unequal, the two outer the shorter.—*W. and A. Prod.* p. 373.

Frequent in pastures, flowering during the rainy autumnal months. The radical leaves are usually pinnated and lie on the ground. The specimen selected for representation is a small one, but as compared with many of the others, this is a small species.

XXXIII.—ARALIACEÆ.

To this order the Ivy *(Hedera Helix)* belongs, and though on these hills we have nothing at all like the true Ivy to recall the fondly cherished associations of our native land: we have several species of the same genus and with them the aid of a name, though the things are most unlike, to make us think of the Ivy clad towers and trees of the old country. The Ivies of India are certainly most unlike those of Europe, but not more so than we find in

other genera. In Ceylon there is a species of fig that so perfectly associates in habit with Ivy, that any person not knowing the difference would almost suppose, on seeing a wall or trunk of a venerable tree covered with it, that he was looking on genuine Ivy.

The difference between that Ivy-like Fig and our stately Banyan tree, is therefore greater than that between the European and Hill Ivies; for even the most arboreous forms of the Hill Ivy when growing along side of another tree or cleft of rock, have a tendency to seek support from it. Both the trees here delineated show that disposition.

This is a widely diffused family, and in proportion to the number of species, India has perhaps the largest proportion, there being about 60 Indian species out of about 200, the remainder being distributed over China, the Eastern Islands, Madagascar, Mauritius, America and Europe. Of that number the Neilgherries furnish a list of no fewer than 8 species, (exclusive of one reduced,) with which I am acquainted, and probably more may yet be found when more carefully explored. All these I refer to the genus *Hedera*, not thinking the genus *Paratropia*, D. C. under which part of them are described in our Prodromus, sufficiently distinguished. They are all more or less arboreous, the wood in all is soft, brittle and very juicy, the juice having a peculiar terebenthine odour when first exuded. The leaves in all are compound pinnate or palmated. The flowers in umbels, the fruit baccate, generally small, about the size of peas.

The nearest relations of this order are evidently *Umbelliferæ* and *Ampelideæ*, but both so widely separated that there seems little chance of any of them being confounded, though all agreeing in some important points.

Regarding properties little can be said, none of those on the Hills so far as I have yet heard, are turned to any useful account; but the Chinese Gensing, a medicine in prodigious repute among the Celestials, is obtained from a plant of this family. Its medicinal properties are perhaps somewhat exaggerated among them, but must have some foundation in truth, otherwise it never could have acquired and maintained the high esteem in which it is held by them.

HEDERA. *Ivy.*

Margin of the calyx elevated or toothed. Petals 5-10, distinct, or cohering at the apex, and falling off like a calyptra. Stamens 5-10. Styles as many as the petals rarely only 4, converging or combined into 1. Berry with as many cells as there are styles.—Climbing or erect shrubs, or trees. Leaves simple or compound. Flowers umbelled or capitate.—*W. and A. Prod. p.* 376.

Between this genus and *Paratropia*, and some others of this family, I can see no difference in the organs of fructification, the real distinction being one of habit. In both the leaves are compound, but in *Hedera* they are pinnate, in *Paratropia* digitate. This difference in my estimation not forming a generic distinction, I have no hesitation in uniting them. According to that difference both the species here represented are Paratropias, and the name having been already established, I shall so far keep it up as to employ it as a sectional distinction. All the Hill species I have seen are arborescus; one, *H. racemosa*, attains a large size, the others are for the most part ramous from the base, and partake more of the character of large shrubs than trees. *H. obovata* frequents somewhat lower levels, such as about Coonoor. *H. racemosa* is met with in the woods about Ootacamund, but sparingly.

In our Prodromus it is remarked that *Paratropia* appears a natural genus, having the leaves digitate and umbels of flowers arranged in racemes forming thyrses, &c., being now impressed with conviction that, so

far as characters derived from the fructification are concerned, no generic difference exists between *Hedera* and *Paratropia*, I have referred all the species of the latter to the former genus, but have retained the latter as a very natural and characteristic subgenus, on account of their digitate leaves and thyrsoid inflorescence; these, in the absence of structural difference of the reproductive organs, not being held of sufficient weight to entitle them to generic value.

HEDERA (P.) OBOVATA (R. W.) arboreous, glabrous, leaves digitate; leaflets about 5, petioled, cuneate, very obtuse or sometimes obcordate, coriaceous: thyrses numerous, aggregate towards the ends of the branches, ebracteate: umbels numerous, solitary on each peduncle; flowers pedicelled: petals, stamens and stigmas eight, rarely six, ovary 8, rarely 6-celled.

A rather widely distributed tree, of small size, occurring in alpine jungles. I have specimens from Courtallum; Shevagherry Hills; Hills near Coimbatore, and from the jungles about Coonoor. One on

cuspidate: thyrses panicled, usually lateral, (from the previous year's wood,) branches racemose, flowers pedicelled, furnished at the base of the pedicel with a small somewhat subulate bractea: petals and stamens 5, styles 5 short: stigmas distinct obtuse: fruit 5-celled.

A large tree of rather rare occurrence. A few fine trees 70 or 80 feet high, and large in proportion are growing in the woods behind Kelso land in Ootacamund. I have met with it in several other places, but no where abundant. The [illegible] inflorescence

able foliage.

HEDERA (P.) RACEMOSA (R. W.) arboreous, leaves digitate: leaflets about 7, form oblong, lanceolate acuminated, undulate on the margin, to elliptic

[illegible] in others they are [illegible] long and about 2 broad; much waved. Flowers and July. The mature fruit scarcely attains [illegible] of a moderate sized pea.

XXXIV.—LORANTHACEÆ

This is a most curious family of (with one exception,) tree parasites. The species are very numerous, but the genera very few. They are always found growing on other plants commonly on branches of trees, but not unfrequently on each other, and I have even seen examples of a new plant parasitic on its own parent. DeCandolle remarks that they grow on nearly all kinds of trees except milky ones. This remark is according to my own observations generally true, but not without striking exceptions, as I have seen them quite abundant on Fig trees, and one *Loranth. Euphorbeæ* R. W. on our milk-hedge (*Euphorbia Antiquorum.*) The family generally most abounds within the tropics, or in the warm regions of the temperate zone, only two species being natives of Europe; but on these hills, with a temperate climate, they are very numerous, Viscums and Loranthi being found every where, scarcely a tree to be met with being constantly free from their visitation, and among them are some very beautiful species. This last remark applies exclusively to *Loranthus*, the species of *Viscum*, though some are very curious, have no beauty to recommend them to our notice; but are not on that account the less deserving of observation, owing to the contrast which they present in habit and appearance, to the tree that supports them, and from which they extract their nourishment.

The species growing on milky plants show clearly that they have the power of elimenation, and can select such portion of the juices only, as are suitable for their nourishment, their own juices being watery, while those of the supporting plant are milky, an interesting fact in the history of these vegetables.

The floral structure of this family furnishes an example of the difficulties which occasionally present themselves, as if, to set at nought classification of the vegetable kingdom,

resting on the assumed uniformity of those organs. Polypetalous flowered families are grouped together in one series; monopetalous ones in another, and apetalous in a third: in this order the three meet—*Viscum* is polypetalous, *Loranthus* monopetalous, *Misodendron* apetalous, and as if that were not enough, we find in Viscum the first and last combined, the male flowers being apetalous, and the female ones polypetalous.

Jussieu's and DeCandolle's systems are based on the structure of the flowers, Polypetalous, Monopetalous and Apetalous flowers, forming their primary subclasses. Such being the case, it is not to be wondered at that much discrepancy of opinion exists among Botanists, as to the place this family should occupy. By most of the Botanists of the present day, it has been placed among monopetalous orders, mainly I believe, on account of the perfect corolla of *Loranthus*, the most prominent genus of the order.

Brown, however, with his usual farsighted discrimination, long ago decided that their proper place is near *Proteaceæ*, an apetalous family; an opinion which is gradually gaining ground, as our acquaintance with Thymalaceous orders enlarges, and must ere long be universally adopted, as there can be no doubt that the nearest relations of the family are to be found in that subclass. *Proteaceæ*, *Olacineæ*, *Thymaleæ* and *Santalaceæ*, are all more nearly allied families than any of those among which they are now generally placed, and all belong to that division of the vegetable kingdom.

Viewed in connection with these families this is a most instructive one, as regards existing systems of natural classification of plants, as tending to show that hitherto, probably, too much importance has been attached to the form, perfection and relative position of the flower, and scarcely enough on the ovarium and its contents; as it is similarity of the latter that furnishes the bond of union by which the genera associated in this family, are held together, notwithstanding the wide discrepancy among their flowers.

Another circumstance may be mentioned, as incidentally tending to confirm the relationship existing between this order and those mentioned above; namely, that DeCandolle has placed the genus of *Schoepfia* among *Loranthaceæ*, while Mr. Bentham a Botanist of the highest attainments, has referred it to *Olacineæ*, an order, on the affinities of which I have already offered some remarks, tending to show that it is erroneously placed by DeCandolle and his followers, on characters taken from the flowers, but not confirmed by the ovarium and fruit.

I have mentioned at the commencement of these remarks, that the species of this order are "true parasites," that is, they send their roots into the substance of, and draw their nourishment from the proper juices of the plant that bears them. In this respect they are unlike epiphites; that is, plants that simply adhere to the bark, but do not penetrate into the substance of the plant. Of this description are numerous *Orchideæ*, and *Mosses* which are nourished by moisture obtained from the atmosphere, and retained by the rough and porous bark of the trees on which they grow.

The process of vegetation can be easily observed, probably in all kinds of Loranthaceæ, but certainly in numerous species of Loranthus; all that is required being to take mature seed, and stick them by their viscum on any substance. In due time the radicle shoots from one end, becomes curved, swells and dilates at the apex, and attaches itself to

the body on which the seed adheres. If that body be a suitable one for its support, a growing plant for example, a radicle in due time issues from the dilated sucker-like portion, penetrates the bark, and extends itself on the wood below. I have seen seed in a state of vegetation on leaves, stones, and in short anywhere, but of course they can only take root when their support is of a kind to admit of it.

The plants of this family abound in the substance familiarly known under the name of, "Birdlime" or viscum. The Mistletoe, the European representative of this family, is well known, at least by name, on account of the superstitious traditions regarding it, which have been handed down to the present time from those of the Druids, among whom it was venerated as a sacred plant.

VISCUM—MISTLETOE.

Flowers dioecious or monoecious. Calyx with the margin obsolete and entire. **Petals** 4 (more rarely 3 or 5,) thick, nearly triangular from a broad base, very shortly united at the base into a gamopetalous 4-partite corolla, or distinct, valvate in æstivation. **Stamens** wanting in the female; in the male without filaments, and with the anthers adnate to the petals, and composed of numerous little cells (or bilocular?): ovary in the female cohering with the calyx. Stigma almost sessile obtuse. Berry umbilicated, internally mucilaginous. Embryo irregular in its direction, sometimes 2 or 3 in the same seed: extremity of the radicle often (always?) protruded beyond the albumen,—Parasitical shrubs, growing on dicotyledonous trees, all (with one exception,) glabrous. Branches terete, tetragonal, or compressed, often jointed. Leaves opposite or rarely alternate, often wanting or reduced to a mere scale. Flowers fascicled, or in spikes.

Of this genus there are about 100 known species. They are generally ramous, pendulous plants, the branches jointed, bearing the leaves and flowers on the joints, the flowers are very minute, and often in the leafy species, required to be looked for before they can be seen. The fruit is usually an oval, pulpy berry, frequently red, when ripe the seed is enveloped in a very viscid mucilaginous substance, by which, they adhere to whatever they touch, and if the circumstances are favourable, vegetate.

In this way they might be easily propagated. The species of this genus have but little in their appearance to recommend them, hence, except as curiosities, they are not worth the trouble. Not so however many of the species of Loranthus, which are indeed very beautiful plants, and might, I think, be easily turned to account for ornamental purposes.

VISCUM ORBICULATUM (R. W.) monoicous, branches four sided, angled: leaves opposite, orbicular, much waved on the margin, slightly 3-5 nerved: flowers sessile, axillary, aggregated, male and female mixed: anthers sessile on the lobes of the calyx, flat, composed of numerous little cells, berries oval, oblong, obtuse at both ends.

A very rare shrub; the plants from which the drawing was made being the only ones I have seen; they were growing on the branches of *Ayapelea arborea*. The draftsman has not correctly represented the anthers, the other parts of the figure are unexceptionable.

VISCUM MONILIFORME (Blume) leafless: stems terete at the base; branches opposite or fascicled, compressed: articulations oblanate-oblong, tapering at the base, 3-4 times longer than broad, costate along the middle but not striated: flowers sessile at the apex of the joints, opposite or in opposite fascicles of 3 together, sometimes nearly verticillate.—*W. and A. Prod p.* 380.

This unlike the preceding, a widely distributed plant, and is found on all kinds of trees, the specimen here given, grew on the *Rhododendron arboreum*, a portion of which accompanies.

VISCUM MONILIFORME *β ovoideum* (R. W.) This variety occurs in the most profuse abundance on the hills, frequenting nearly all kinds of trees and shrubs, but is probably most frequent on a species of *Ilex*. The specimen from which the drawing was taken, grew on a species of *Ayapelea*, on the banks of the Pycarah River. This variety seems quite dioecious; but I have never met with a male plant among hundreds that I have examined. Judging from the specimen figured, it might well be considered a distinct species, but extended examination of the plant in all its forms, scarcely warrants its separation from the preceding.

LORANTHUS.

Flowers usually bisexual. Calyx-tube ovate, rarely turbinate: limb short, truncated or toothed. Petals 4-6, usually 5-6, either distinct or more or less united: æstivation valvular. Stamens as many as the petals and opposite to them: filaments adnate to the base of the petals, free at the apex; anthers 2-celled, adnate, or erect, or versatile. Style filiform. Stigma simple, capitate or turbinate. Berry roundish, ovate, or oblong, or turbinate, 1-celled, 1-seeded, usually crowned with the limb of the calyx. Shrubs usually parasitical, rarely growing on the ground. Leaves opposite or alternate, entire, usually thick and coriaceous. Flowers spiked, or racemose, or panicled.

The Neilgherry species of this genus are numerous and individually abundant. How many species there may be is very doubtful, but my impression is, that as many as 20 are natives of these Hills, though I have not yet collected so many. Every wood about the Hills abounds with them, and scarcely a tree grows but is subject to their attacks. In their general appearance they greatly vary; some are stout, erect growing shrubs, some slender, twiggy and pendulous, some with bright foliage, at first of the richest crimson tints, while others are of the most dull and unassuming. The colour and appearance of the flowers equally vary; some are large and richly coloured, others smaller, but still conspicuous for the richness of their colouring; while others are the dullest imaginable, and as if to conceal the little colour they have, are clothed with dirty whitish or tawny coloured hairs. Many attain a great size, and by their drain on the vital fluids of their support, speedily induce the premature decay consequent on deficient nourishment.

LORANTHUS NEILGHERRENSIS, (W. and A.) glabrous: branches terete, young ones obscurely and bluntly angled: leaves alternate, elliptic-oblong, shortly petioled, thick and somewhat fleshy, ultimate one of the branch (always?) orbicular ovate: peduncles axillary, aggregated, very short, about the length of the petiole, bearing an umbel of 3-7, very shortly pedicelled flowers: bractea solitary under the ovary and close to it, lateral, ovate: margin of the calyx obscurely repand toothed: corolla glabrous, ventricosely gibbous at the base, equally 5-cleft to beyond the middle; segments cuneate linear, recurved.—*W. and A. Prod. p.* 382.

This is a fine species of great size, and when in perfection, most conspicuous from its numerous deep red, almost crimson coloured flowers, which completely cover the branches, while the young leaves on the new shoots, are also often deep red.

XXXV.—CAPRIFOLIACEÆ—HONEYSUCKLE TRIBE.

This is a small, but to the Horticultural Amateur, an interesting family, as including within its narrow limits the Elder, the Honeysuckle, the Tinus and Lauristinus, Guelder, Rose, and numerous other ornaments of the shrubbery and arbour. They are the more esteemed as, being for the most part natives of temperate climates, they are hardy enough to bear the winters of England. In its geographical distribution this family occupies a wide range, extending from Lapland within the arctic circle, where *Linnæa borialis* is indigenous to New Zealand, nearly 50° South of the equator, the native country of the genus *Alseuosmia*: and all round the world from the Western shores of America, to the Eastern ones of China and Japan. But while thus extensively inhabiting the temperate regions of both hemispheres, they are of rare occurrence within the tropics; except where, as in the instance of these mountains, local circumstances produce a temperate climate.

In Nepaul and the Hymalayas generally, they are numerous; upwards of 20 species being described from the valley of Nepaul alone; thence they extend Southward to Ceylon, and Eastward to Japan. On the Neilgherries 6 species are indigenous, two of *Lonicera*, and four of *Viburnum*: thereby indicating by their vegetable productions, the extra-tropical character of the climate of these Hills.

The order itself, in its Botanical characters, is one of great simplicity, being quinary in all its parts except the ovary, which is usually 3-celled or, in other words, made up of 3 united carpels, each cell usually containing several ovules. I have however specimens of *Lonicera Leschenaultii*, (the common Hill Honeysuckle,) with four and five celled fruit: this however is a rare and accidental variation probably depending on some local cause.

Three carpels, with several ovules in each, is the usual number in *Lonicera*, and most of the other genera; but *Viburnum* departs widely from the character of the order in that respect. as I find, in all the species I have examined, upwards of 20 in number; it has constantly a solitary carpel with a single ovule pendulous from the apex of the cell. Thinking this structure limited to the Neilgherry species, my first thought was to remove them from the rest of the genus, which nearly all modern Botanists describe in such a way, as either to lead to the inference, that it has a plurality of cells and ovules, or actually assert, that such is its structure: and had I not possessed specimens of two common European species which agreed in structure with our Indian ones, I would undoubtedly have acted on my first impressions, on the supposition that the Indian members of the family had been referred to it on external appearances only, without sufficient examination; and as affording a striking illustration of the importance of Geographical distribution in the limitation of genera. The case however as it now stands, is less creditable to the leaders of the science in Europe, than I at first supposed.

The affinities of this order need not be dwelt upon: it is evidently most nearly related to *Rubiaceæ*, from which indeed it scarcely differs except in the want of interpetiolar stipules, a character of great importance as being the only invariable bond of union by which the large assemblage of plants, congregated under that family, are held together. In one tribe hitherto associated with Rubiaceæ, they are wanting or doubtful, and that has, by Dr. Lindley, been removed from them as a distinct order, under the name of *Stellatæ*. The peculiar structure of the ovary of *Viburnum*, furnishes a connecting link with *Loranthaceæ*, and previously suspected, an order in other respects far removed.

VIBURNUM. Guelder Rose. Lonicerinæ.

Limb of the calyx small, 5-cleft, persistent. Corolla rotate, somewhat cam[illegible]lar, 5-lobed. Stamens 5, equal. Style none or short. Stigmas 3. Berry by abortion 1-seed, [illegible]se, crowned with the teeth of the calyx. Seed compressed.—Shrubs. Leaves opposite, petioled, entire or lobed. Corymbs terminal. Flowers white, or slightly reddish.—*W. and A. Prod. p.* 388.

This is an extensive genus consisting for the most part of handsome flowering shrubs with some small trees, I am not aware of any of large dimensions; several of the species are much cultivated as ornamental shrubs, and are prized on account of their property of flowering late in autumn or winter, when other flowers are not to be had. According to the most recent enumeration, the genus includes nearly 70 species, natives of Europe, Asia and America. Among the Asiatic species several are from China and Japan, and four are natives of the Neilgherries; a 5th, *V. pubigerum* described in our Prodromus, I have since ascertained to be an imperfect specimen of *V. Wightianum*.

These are all handsome flowering shrubs generally meriting a place in gardens, though their claims to this distinction are, as will be seen from the plates, very unequal.

In the above genuine character which is copied from DeCandolle, and adopted [illegible] the fruit is said to be a "*berry by abortion* one-seeded." This is a mistake: it is one-seeded, but not by abortion, as the analysis of the ovary of all the species will show that the ovary contains only one [illegible] consequently no abortion can have taken place when that one comes to maturity.

DeCandolle divides the genus into three sections—Lentago, Opulus and Solenotinus. To the first we have referred *V. acuminatum* and *capitellatum*; and to the last *V. hebanthum* and *Wightianum* if in this distribution we are correct, these two sections must indeed be very arbitrary and quite inapplicable in practice, as I have never yet been able to apply them: the error, however, may be ours, not his, as none of our species are described by him.

VIBURNUM ACUMINATUM, (Wall:) young branches, petioles, and peduncles dotted with small rusty-coloured scales: leaves elliptical, acuminated at both ends, coriaceous, quite entire with margin slightly recurved, glabrous: upper side shining, under covered with minute shining rusty coloured dots: cormyb terminal, large, trichotomous, often larger than the leaves: stigmas sessile: berry oval-oblong.—*W. and A. Prod. p.* 388.

A common and widely distributed species; but rarely, if ever met with at the elevation of Ootacamund: at Coonoor and for two or three miles below that place, it is very common and when in flower, a very handsome shrub. I have specimens from several other alpine stations, but have never seen it under three or four thousand feet of elevation.

In some situations it may almost be called a small tree: generally it is a large ramous shrub.

VIBURNUM CAPITELLATUM, (W. and A.:) free from scales, quite glabrous except in the axils of the nerves: leaves oval-lanceolate, with a few distant wavy teeth, attenuated at the apex into a rather fine point, under side with the axils of the nerves woolly: cymes compound, somewhat umbel-shaped, 3-6-partite; flowers umbellate, several together, nearly sessile at the extremity of the ultimate divisions: flower-buds viscous and shining: stigmas sessile: berries oval-oblong.—*W. and A. Prod. p.* 388.

The specimens from which the accompanying drawing was made were found in the neighbourhood of Kotagherry. I have other specimens from the Pulny range, found at a nearly similar elevation: but I do not recollect having observed it about Ootacamund. It is a handsome shrub, very nearly allied to the next, but evidently distinct. Flowers during the autumnal months.

VIBURNUM HEBANTHUM, (W. and A.:) branches, petioles, and general peduncles glabrous: leaves elliptical or obovate, shortly acuminated, obtuse or acute at the base, slightly sinuate-toothed on the lower half, coarsely so toward the apex, woolly in the axils of the nerves on the under side, otherwise glabrous: partial peduncles of the cormyb pubescent: corolla tubular campanulate, softly pubescent, limb very small, nearly erect, 4-5 times shorter than the tube: style very short and thick.—*W. and A. Prod. p.* 388.

A very common shrub or small tree, all over the higher ranges of the hills. The specimen from which the figure is taken does not convey a favourable impression of the inflorescence, but can scarcely be said to be unfavourable, as in that respect, it is certainly the least striking of the Neilgherry species. It begins to show its flowers in February, but is not in perfection until March and April.

VIBURNUM WIGHTIANUM, (Wall.:) branches, petioles, peduncles, pedicels and flowers glabrous: leaves oval, shortly acuminated, obtuse at the base, quite entire on the lower half, sharply serrated towards the apex; upper side glabrous; under slightly puberulous when young, nearly glabrous when old, the nerves densely pubescent and their axils woolly: cormyb shortly pedunculed, somewhat panicle-shaped: bracteas linear, pubescent and ciliated: corolla hypocrateriform; limb spreading, conspicuous, about 4 times shorter than the tube: ovary linear: style very short and thick.—*W. and A. Prod. p.* 388.

A moderate tree or large shrub frequent in the woods about Ootacamund, flowering in April and May, but generally to be met with at other seasons. The fruit in this, like those of the preceding, is an oval succulent drupe, red and subacid when ripe.

LONICERA—HONEYSUCKLE.

Calyx 5-toothed. Corolla tubular, campanulate, or infundibuliform: the limb 5-cleft, often irregular. Stamens 5. Style filiform. Stigma capitate. Berry 3- (or by abortion sometimes 2-) celled, the cells few-seeded. Seeds crustaceous. Erect or climbing shrubs. Leaves opposite, sometimes connate, entire or occasionally slightly runcinate. Inflorescence axillary, various.—*W. and A. Prod. p.* 389.

Many of the species of this genus, like those of Viburnum, are general favourites as ornamental plants, especially among the lovers of arbours, for the construction of which the trailing habit, and the profusion and fragrance of their flowers admirably adapt them. In regard to the limits of the genus different Botanists have taken very different views. Linnæus combined 4 of Tournifort's genera, in the formation of his genus *Lonicera*. Jussieu took a different view, and divided the Linnean genus into two, *Caprifolium* and *Xylosteon*, thereby obliterating Linnæus' generic name. This division was followed by most Botanists until the publication of the 4th volume of DeCandolle's Prodromus, where he restored the Linnean genus, vastly augmented in the number of its species, though he had himself previously followed Jussieu. Since that time Botanists generally seem to have followed that great authority in reviving *Lonicera* as the generic name, and reducing *Caprifolium* and *Xylosteon* to the rank of subgenera. Lindley, however, in a very recent work of his, "School Botany," still retains the genus *Caprifolium*, as distinct from *Xylosteon* or *Lonicera*, (the name he has by some oversight em-

ployed) though I confess I cannot see upon what grounds, as I cannot help thinking that to keep up both is to retain two most artificial, almost indistinguishable genera; where one most perfect and compact is already formed by nature herself for our acceptance. He, I am aware, upholds the [illegible] is preferable to excessive synthesis; of the truth of which there cannot be a d[illegible] extensive and careful observation and accurate knowledge of the value of our generic characters; but not otherwise. Loosely constructed verbose characters very analytical in appearance, but quite the reverse when themselves thoroughly analysed, are the bane of natural science: we are too much given to the subdivision of really natural genera on the principle above stated, that excessive analysis is better than excessive synthesis, a principle which, however good in the abstract, can yet be carried too far. Under this conviction it appears to me, DeCandolle has done well to reunite them; as combined, they form a most natural genus, but separated, two very artificial genera.

As it now stands, the genus *Lonicera* includes nearly 70 species drawn from China, Japan, Southern and Northern India, Europe and America: and is divided by D. C. into two sections or subgenera—viz., Caprifolium and Xylosteon, which last is again subdivided into 4 subdivisions; both our Hill species belong to the latter suborder. The plants of which it is composed are only useful for ornamental purposes: forming arbours covering the trunks of a venerable tree, or the face of a wall which it is supposed will look better when richly clothed with luxuriant vegetation than as a naked surface. The one here given, *L. ligustrina* possessing none of the trailing habit which predominates in the genus, is used as a substitute for privit, in the formation of garden fences for which it is well adapted; and is named in accordance, *ligustrina*, being the generic name of the privit.

LONICERA (X) LIGUSTRINA, (Wall.) stem somewhat erect and bushy; branches slender, slightly twining, younger ones hairy or pubescent: leaves shortly petioled, ovate-lanceolate, acute, obtuse at the base, quite entire, shining, sprinkled on the margin and when young on the midrib beneath with spreading hairs: peduncles a little longer than the petioles, slightly drooping at the apex, 2-flowered, axillary and solitary: bracteas, a subulate one at the back of each ovary, and one cup-shaped closely surrounding and containing both ovaries: calyx limb constricted in the middle, the margin 5-toothed teeth oblong, short: corolla puberulous, infundibuliform; tube rather short, gibbous on one side at the base; berries distinct, both covered by the common bracteæ.—*W. and A. Prod.* p. 389.

This is a very common plant about Ootacamund, and like the privit is much used as a fence about gardens for which purpose it answers well, forming a very compact one. The flowers are too small and too few in proportion to the quantity of leaves, to admit of its being considered an ornamental flowering shrub, but so far as general form is concerned, were shrubberies more in vogue on the hills, it would well merit a place in them.

XXXVI.—RUBIACEÆ—Juss.—CINCHONACEÆ—Lind.

In giving names to families, the rule is to select one of the most characteristic genera of the group, and alter the termination of the name by an affix, *ceæ*, being the one usually employed in Botany. Both the above names are constructed on this principle, *Rubiaceæ* being derived from *Rubia*, and *Cinchonaceæ* from *Cinchona*; to this extent therefore, they are both unobjectionable. But the genus Rubia belongs to a small section of the order, and that presenting peculiarities which, in the opinion of Dr. Lindley, justify its separation from the rest of the family and elevation, to the rank of a very distant and well defined natural order. In accordance with this view he gives a new name to the old order, and selecting the well known *Cinchona* (Peruvian Bark,) as the type has, in his natural system, called it *Cinchonaceæ*, appropriating *Stellatæ* or *Galiaceæ*, (from *Galium*) to the new one by which arrangement the confusion apt to originate in appropriating a new meaning to old names, is avoided.

The family even after this division, is still a large and important one, contributing greatly to the comforts of mankind through the powerful medicines (Bark and Ipecacuana,)

which it provides, as well as by the grateful and nutritious beverage (coffee,) which it supplies.

Its predilections as regards temperature, are decidedly tropical, or subtropical; not one species—excluding *Stellatæ*—being, so far as I am aware, indigenous even in the South of Europe; while within the tropics they are estimated to constitute 1-29th of the flowering plants. At this rate and assuming that on the higher ranges of these Hills there are 1000 species of flowering plants, which I dare say is near the truth, there should be 38 species of Rubiaceous plants. This, I think, is somewhat beyond the truth, though not much.

This estimate though derived partly from assumed data, for I have never counted the number of species in my hill collections, is I believe very near the truth; and tends to show that this climate partakes more of the tropical character than some of the examples previously noticed would lead us to expect; and that, although an immense improvement on what we have on the plains, we must still look upon it as tropical, and inferior to even the South of Europe, as a temperate region, unless it can be shown, that the temperature is modified in its effects on the constitution by the very rarified atmosphere, requiring a greater volume of air, by probably nearly ⅓th, to be respired to yield the same quantity of oxygen to the circulation that would be obtained in a similar temperature on the level of the sea. This is not the place to consider what effect this difference may have in modifying health and disease, though it seems quite in place to advert to the circumstance in connection with facts deduced from a consideration of the natural products of the region.

In a purely Botanical point of view, this is a most interesting family; being in some respects most heterogeneous in its composition, while in others it is one of the best marked and most clearly defined, *Compositæ* perhaps excepted, in the system of plants. The question will naturally arise how can such a paradox be explained.

It is clearly defined by its monopetalous corolla, inferior ovary, and opposite leaves with intermediate stipules. The last is, however, the most constant character, and the one by which only it is "strictly limited." We have other orders with monopetalous corollas, inferior ovaries and opposite leaves; but *Cinchonaceæ* alone, are these combined with intermediate stipules, which is in fact the essential character of the order, and in this respect it is most constant; ex-stipulate plants being almost uniformly rejected. It is on the other hand most heterogeneous in the structure of its ovary and fruit. One tribe *Opercularieæ*, has a one-celled, one-seeded fruit. Another *Spermacoceæ* has a dry 2 or 4-celled fruit, with one seed in each. *Cuffeaceæ* has a berried 2-celled fruit, with 1 seed in each. In *Pœderieæ* the two carpels are suspended from the apex of a filiform axis, as in *Umbelliferæ*. *Guettardaceæ* has drupaceous fruit, with from 2 to 10 stones. In all these the cells of the fruit are one-seeded. In *Hamdieæ* the fruit has many cells, and the cells many seed. In *Hedyotideæ*, the fruit are two-celled with many seed in each. In *Gardeniaceæ*, the fruit is one or two-celled indehiscent with numerous parietal seed, while in *Cinchoneæ*, it is a 2-celled capsule with numerous winged seed.

All these tribes differing so widely in these most essential organs, the ovary, fruit and seed, are yet all bound together by means of the opposite leaves with intermediate stipules. The *Stellatæ* want that character, having in lieu of it, a whorl of leaves round the joints of the stem, on which account mainly, Lindley removes them from the order. *Caprifoliaceæ*

has opposite leaves, but no stipules; had they stipules, they must have been united, there being no other point of structure to separate them. *Apocyneæ* in like manner has opposite leaves without intermediate stipules, but combined with a superior ovary (a good character, but not unexceptionable, as there is a Cinch[illegible]nus with a superior ovary,) *Loganiceæ* has stipules, but they are supra axillary and [illegible] and combined with a superior ovary. They agree, however, so well with *Rubiaceæ*, that they have been designated "Rubiaceæ with a free ovary." *Rubiaceæ* are considered by many Botanists nearly allied to *Compositæ*, this relationship does not strike me as near, though it certainly exists.

To this order we are indebted for that, to India, most valuable of medicines *Bark*, and its derivative Quinine also, for Ipecacuana with many others of minor note. The roots of *Morinda tinctoria* and of *Hedyotes (Oldenlandia) umbellata* supply very permanent red dyes, especially the latter, which is the basis of the bright Modina red so highly prized among natives of India—and last, but not least, to this family we owe that most delightful and wholesome beverage, Coffee and a few esculent fruits. A few species yield useful timber, such as our bastard cedar, the produce of our *Hymenodyction excelsum*, *Nauclea cordifolia*, and one or two other species of the same genus, which attain a large size in the Malabar jungles, also supply timber, but of inferior quality and of a yellow colour.

HEDYOTIS

Calyx-tube ovate or globose: limb 4-toothed or 4-cleft, the teeth or segments persistent, without smaller intermediate ones. Corolla somewhat regular, infundibuliform, tubular, or rotate, 4-cleft, the segments imbricated (not twisted) in æstivation. Stamens 4, inserted into the mouth of the tube, or a little below it: anthers roundish, oblong, or short linear. Ovary crowned with a fleshy disk. Style filiform. Stigma bifid or 2-lobed, rarely entire. Capsule obovate, ovate or globose, crowned with the limb of the calyx, 2-celled, dehiscing at the apex within the calyx, in a direction transverse to the dissepiment, at length sometimes splitting to the middle or to the base, and either loculicidal or septicidal. Seeds usually minute, numerous and angled, rarely few or solitary in each cell.—Herbaceous, suffrutescent, or shrubby plants. Stems 4-angled or terete, branches sometimes compressed. Stipules cohering with the petioles, usually fringed with several bristles, rarely entire. Inflorescence various.—*W. and A. Prod. p.* 405.

It is well remarked in our Prodromus, that this is a polymorphous genus not only in habit, but also in characters, for it certainly is such. But though this is the case, they are generally readily recognized. Some certainly have so much the habit *of Spermacoceæ*, that dissection of the ovary or fruit, is required to determine to which of the two tribes they belong.

The species of this genus are numerous on the Hills, and many of them most unlike each other; some being large handsome flowering shrubs, and others minute, almost inconspicuous herbs. Here they are found in nearly all situations, and flowering at all seasons. The larger shrubby species are in greatest perfection about the beginning of the year, February and March, and then they are truly most conspicuous objects, when growing in somewhat moist, sheltered situations.

HEDYOTIS LAWSONIÆ, (W. and A.: shrubby, glabrous: branches 4-angled: leaves oblong-lanceolate, acuminated at both ends, petioled; nerves few and distant, curved: stipules deciduous, triangular-ovate, acuminated, the point thickened and glandular-lobed; the margin entire: panicle spreading: calyx-limb cup-shaped, 4-toothed: corolla externally glabrous, villous in the mouth, and on the segments slightly protruded: style considerably protruded: capsule obovate, dicoccous.—*W. and A. Prod. p.* 407.

A handsome but neglected shrub, found in the woods about Ootacamund and elsewhere, not very rare on the Hills. The flowers, which in fine plants, form much larger clusters than those here represented, are so much of the lilac colour, that introduced into shrubberies, and some care bestowed on its cultivation, it might become a passing good substitute for the lilac. In open exposed situations where the soil is poor, it rarely exceeds two or three feet in height; but in shady woods with moist and rich soil, it rises to six or even eight feet, and when covered with blossoms is really a beautiful object. The upper flower-

ing branches only are four-sided, the older ones become nearly round. The drawing was made at Kotagherry in August, where it comes into flower during the rainy season.

HEDYOTIS STYLOSA (Brown :) shrubby, glabrous: branches somewhat terete or obtusely 4-angled: leaves from oval to oblong-lanceolate, acuminated at both ends, petioled; the nerves on the under side strong, armed, slightly branched: stipules somewhat permanent, triangular-ovate; their margin pectinately pinnatifid, the segments long, filiform, hirsute: panicle spreading: calyx-limb cup-shaped, 4-toothed: corolla externally glabrous, villous in the mouth on the segments: filaments considerably protruded: style much protruded: capsule ovoid, dicoccous.—*W. and A. Prod. p.* 389.

This is a much more abundant shrub than the preceding, and the clusters of flowers being larger, it is really a showy plant; but I have not once seen it in cultivation though abundant in the woods. The flowers are nearly white, and it is in flower at nearly all seasons.

HEDYOTIS (D.) VERTICELLARIS (Wall *Hed. plantaginifolia Arn. pag?*) perennial herbaceous, leaves nearly all radical, linear-lanceolate, nerved, plaited between the nerves glabrous, overlapping at the base; those of the scapes linear lanceolate: scapes as long or longer than the leaves, leafy; lower pairs of leaves distant opposite; upper ones approximated verticelled: stipules between the distant pairs bristle toothed; flowers sessile, capitate and terminal, or verticelled in the axils of the upper leaves: heads from the axils of the lower pairs peduncled: calyx segments linear lanceolate as long or longer than the tube of the corolla: corolla infundibuliform, hairy in the throat: stamens more or less exserted or included.

This unlike the other two, is a low herbaceous plant with perennial roots, or more correctly underground stems, the leaves spreading on all sides like a star on the ground. They have much the appearance of a *Plantago*, and like it are traversed by strong nerves running from the base to the apex, when young somewhat plaited. It grows in low, wet or even marshy soil. On the banks of the Pycarah river it is met with in considerable abundance, but on the Koondahs it is most abundant, every piece of marshy ground being full of it. It is every where in flower during the earlier months of February, March and April, but I first found it at Pycarah, in full flower in November; I therefore infer it is in flower at all seasons. It will form a very distinct section of the genus along with one or two Ceylon ones agreeing in its acauline plantago like habit. The flowers are lilac coloured interruptedly panicled on axillary peduncles. The leaves are so numerous and closely set at the base, that they hold water, hence I have always found a quantity of water in their axils however dry the weather, as if they had recently been exposed to a shower of rain. When in full flower it is certainly a beautiful plant. I can see no difference between this and *H. plantaginifolia* Arnott, and feel confident this last has been added to the list of described species, owing to Dr. Arnott not having a specimen to compare, and our description having been made from a scape only, not a perfect plant. The proper stems of both are under ground rhizoma, the leaves and scapes are the same in both—and so are the flowers and seed.

WENDLANDIA.

Calyx-tube somewhat globose, often striated: the limb very short, composed of 5 small persistent teeth. Corolla with the tube longer than the calyx, widest at the throat, glabrous or nearly so on the outside: limb spreading, 5-lobed; the lobes oblong or lanceolate, acute or obtuse, imbricated and slightly twisted in æstivation, and forming a globose or oval head to the flower-bud. Stamens 5; filaments springing from the very top of the tube, often very short: anthers oblong, exserted, oscillatory. Ovary crowned with a fleshy disk. Style exserted, filiform. Stigma of two pretty large, oval, thickish segments. Capsule globose, crowned with the limb of the calyx, 2-celled, splitting at the apex, loculicidal. Seeds minute, numerous in each cell.—Trees or shrubs. Leaves coriaceous, oval or lanceolate, petioled. Stipules solitary on each side, broad at the base, acuminated. Panicles thyrsoid, terminal, many flowered. Flowers white, small, very shortly pedicelled, forming spikes or fascicles along the ultimate ramifications of the panicle.—*W. and A. Prod. p.* 402.

There is, so far as I have been able to make out, only one species of this genus on the Hills, and that does not ascend to the higher ranges. About Coonoor and on that level it is very abundant; it also abounds about Kaitie Falls, where I obtained the specimen here delineated, in February, just coming into flower. When in flower this is a very handsome shrub, each branch terminating in a large panicle of whitish or pale rose coloured flowers.

WENDLANDIA NOTONIANA (Wall.:) arboreous, with the young shoots hirsute: leaves petioled, oblong, slightly tapering at both ends; upper side glabrous, under somewhat glaucous, more or less minutely pubescent, often nearly quite glabrous except on the nerves and veins: stipules triangular-ovate: hirsute at the base; the upper part glabrous, recurved: branches of the panicle hirsute, somewhat erect, flowers crowded and forming interrupted spikes: calyx hoary, the teeth triangular, acuminated: corolla glabrous, 6-8 times longer than the limb of the calyx tube widened at the mouth; divisions of the limb oval, obtuse, recurved; anthers nearly sessile: capsule sprinkled with short hairs.—*W. and A. Prod. p.* 403.

A large and very beautiful shrub frequent about Coonoor and Kotagherry, but not ascending to the elevation of Ootacamund. It also occurs abundantly, and in great perfection about Kaitie Falls, flowering in February and March, when it is most ornamental, often attaining a height of from 10 to 15 feet, with every branch terminated by a large panicle of reddish white flowers.

LASIANTHUS, Jack—*Mephitidia*, D. C. *Santia*, W.

Calyx, limb 4-7 cleft. *Corolla* 4-7 cleft: *throat* and *limb* usually hairy. *Stamens* 4-7 inserted near the throat: *filaments* short: *anthers* oblong, scarcely exserted. *Ovary* crowned with a fleshy disk, 2-7-celled with a single erect ovule in each: *style* about the length of the corolla: *stigma* usually capitate, 2-7-lobed. *Drupe* globose, containing 2-7 nuts. *Nuts* usually rugose, or furrowed on the back. *Seed* erect: *albumen* fleshy, enclosing a cylindrical erect embryo.

Shrubs or small trees. Young branches, petioles and costa of the under surface of the leaves, densely clothed with long matted, or rigid adpressed hairs. *Stipules* caducous, bearing a ring of hairs or filiform bristle-like scales. *Leaves* short, petioled, usually elliptic, oblong, more or less acuminated at the apex, and tapering at the base; often hirsute on both sides, but generally on the costa and veins. Veins prominent, pinnate, running in curved lines towards the margin, the last pair forming, with the costa, a 3-nerved termination of the leaf; veinlets conspicuous, passing in nearly straight lines between the costa and veins, giving a peculiar and unique character to the venation. *Bracteæ* often large and [illegible]ely clothed with long matted hair, forming a thick involucrum round the axillary sessile [illegible]. Flowers always small in all the genuine species I have seen. *Calyx* limb sometimes much produced, and parted to the base into subulate or lanceolate teeth; sometimes short and obtusely lobed, rarely truncated, and furnished with short, almost inconspicuous teeth. *Corolla* small, tubular, lobes of the limb spreading, and, with the throat, generally hairy. *Drupe* usually succulent, generally blue when ripe.

The hairs on all parts of the plant, especially where long and shaggy, are [illegible] the species almost approaching to moniliform. The leaves are said by Blume, to exhale a disagreeable odour; this I have not observed. In this definition of the genus, I have abbreviated the essential character, and extended the natural one, in the hope of giving it greater precision and strength.

This genus was first established by the late Mr. William Jack, for the reception of some plants, natives of the Eastern Islands. For reasons which I cannot adopt, it was changed by DeCandolle to Mephitidia. I therefore restore the original name, having fully stated my reasons for doing so in a paper published in the Calcutta Journal of Natural History. When preparing our Prodromus, we found specimens of the accompanying plant in my collection, and as it is somewhat different from the original species of the genus, we supposed formed the type of a new one, which we named *Santia*. That genus I also reduce, as not being sufficiently distinct from Jack's, hence the above two synonyms. Before doing so, I availed myself of the ample opportunities I had, of examining our plant in all its varying forms and stages, as well as comparing it with several other species in my collection, two or three of which are natives of the Hills, abounding on the western slopes towards Syperah.

This genus is remarkable for its tendency to variation in the number of the parts of its flower. The calyx is from 4 to 7 lobed, so is the corolla, the stamens and styles vary in like manner from 3 to 7, but in habit, the agreement throughout the whole, is quite remarkable, and is most conspicuous in the variation of the leaves which is quite peculiar. In nearly all, the flowers are axillary and nearly sessile, forming double capitula in the axils, generally furnished with bracteæ, in some very large, quite foliaceous; in nearly all the lobes of the corolla is densely clothed with short hairs, giving it a velvetty appearance, whence the generic name, in all the ovules are erect, a useful mark towards distinguishing them from some other genera, with pendulous ovules, and in nearly all the fruit is a blue berry. The leaves of some exhale a fœtid odour, which suggested the name Mephitidia.

The genus includes about 40 known species, all natives of India and the Eastern Islands, and it seems probable there are many yet to be discovered. Regarding their properties nothing is yet known; most of them are shrubs.

LASIANTHUS VENULOSUS (R. W. *Santia venulosa* W. and A.) shrubby, glabrous: stipules triangular hairy: leaves coriaceous, short petioled, elliptic-oblong, cuspidate or acuminate, glabrous above; veins prominent on both sides beneath sprinkled with hairs: cymes axillary, short peduncled, few (3-5) flowered: bracteæ small hairy: calyx 4-6 parted, divisions subulate, as long as the tube of the corolla: corolla 4-5 cleft, throat and lobes hairy: stamens 4-5: style as long or often longer than the corolla 3-5 lobed: cells of the ovary equalling the lobes of the stigma; a single erect ovule in each.

Common in the woods about Ootacamund, and generally distributed over the higher ranges of the

Hills—a very ramous shrub: leaves from 2 to 4 inches long by about half as much broad, of a light yellowish green colour, sometimes acuminate, oftener cuspidate. Flowers pale yellow or cream coloured, berries about the size of a pea, succulent, blue. The long teeth of the calyx of this species, is very characteristic. The inflorescence is essentially cymose, but the peduncles are sometimes reduced to one flower.

CANTHIUM.

Calyx-tube ovate; limb short, 4-6 toothed. Corolla with a short tube, bearded in the throat; lobes 4-5, spreading. Anthers 4-5, inserted into the throat, scarcely exserted. Style filiform exserted. Stigma thick, ovate-globose or mitriform, undivided or bifid at the apex. Drupe globose or compressed, crowned with the (sometimes inconspicuous) calycine teeth, fleshy, 2-celled. Seeds solitary in each cell, inserted near the apex, inverted, incurved. Albumen fleshy. Embryo central: radicle long, superior.—Shrubs, with branches unarmed or thorny. Leaves opposite, somewhat coriaceous. Stipules interpetiolar, solitary on both sides. Peduncles axillary, short, several flowered.

The plants composing this genus are for the most part thorny shrubs; the one here represented, however does not partake of that character, and is, I believe, the largest and handsomest species of the genus: so far as the flora, this part of India is concerned, it certainly is. There is another species very like this in every thing except one point, the inflorescence, which is sufficiently abundant on the plains of India, this I have never seen except as an Alpine plant. The other, *C. didymum*, differs from this in having a loose cyme of flowers in the axils of the leaves, while here all the branches which go to form the cyme in that, are united into one, forming together a thick, short peduncle, the somewhat dilated apex of which is covered with longish pedicelled flowers, forming a simple umbel, whence the name.

The genus itself is not considerable, including only about 24 or 25 species, and of these not one of any note. It belongs to the *Coffea* section of the order, distinguished by having a two-celled ovary with a single more or less pendulous ovule in each. The flowers of this genus possess a peculiarity not elsewhere met with, so far as I am aware, the throat is full of hair, the lower series of which, in place of being directed upwards towards the surface, hangs downwards like a curtain within the tube. In the flowers of our plant, this is not so conspicuous as in some of the other species, and requires to be looked for, to be properly seen, and has evidently escaped the observation of the artist, who has not done justice to that part of the analysis. The stigma of all the species is large, more or less mitriform. These are the only points of any note, and in truth, may almost be said to constitute the character of the genus, which seems so little distinguished from several others in its vicinity, each consisting of few species, that one can scarcely avoid thinking some of them might have been dispensed with by merely giving a slight extension to the character, among which *Damnacanthus*, *Plectronia*, and *Psydrax* may be mentioned: *Dondisia*, D. C. has been already referred here.

CANTHIUM UMBELLATUM (R. W.) shrubby or subarboreous, unarmed; young branches four-sided: leaves short petioled, oval acuminated glabrous, coriaceous: flowers axillary umbelled on a short thick peduncle: calyx limb obtusely 5-lobed: tube of the corolla hairy within, the lower hairs pointing downwards: stamens 5: style exserted: stigma mitriform, 2-lobed, fruit oborate didymous.

An alpine plant rather rare on the Neilgherries about the elevation of Kotagherry, where in the Orange Valley I found it forming a moderate sized tree. I also found it in great abundance on the tops of the Hills at Shevagherry in full flower in September. It is very nearly allied to *C. didymum* from which it scarcely differs except in the inflorescence, and subarboreous habit of the plant generally: the leaves when the two are compared are found much larger and more coriaceous in this, but its most striking characteristic, is the union of all the branches of the cyme into a single stout peduncle from the dilated apex of which, the flowers rise on short pedicels—Flowers white.

GRUMILEA.—PSYCHOTRIA.

GRUMILEA (*Gært.*) Calyx-tube obovate, very short; limb cup-shaped, truncated and 5-toothed. Corolla infundibuliform; tube short, villous in the mouth: limb 5-partite, segments incurved at the point: æstivation valvular. Stamens 5, inserted upon the tube: filaments short: anthers oblong, exserted. Style filiform, the length of the tube or of the corolla, surrounded at the base by a short cylindrical or 5-lobed fleshy disk. Stigma bipartite (occasionally 3-partite); divisions thick. Berry crowned with the converging limb of the

calyx, ovate-globose, somewhat coriaceous, 2- (or occasionally 3- sometimes from abortion 1-) celled. Seeds solitary in each cell, plano-convex or angled. Albumen somewhat cartilaginous, grumose (divided into small lobes by numerous chinks and fissures). Embryo erect, small, slightly curved, somewhat dorsal: cotyledons lanceolate.—Glabrous shrubs. Leaves opposite, petioled, attenuated at the base. Stipules usually with hair at their base on the inside, often caducous. Corymbs terminal. Flowers sessile.—*W. and A. Prod. p.* 432.

PSYCHOTRIA (*Linn.*) Calyx-tube ovate; the limb short, 5-lobed, 5-toothed or somewhat entire. Corolla infundibuliform, usually short, 5- (or rarely 4-) cleft, regular: throat glabrous or bearded; limb spreading or recurved, segments incurved at the point: æstivation valvular. Stamens 5 or rarely 4; the anthers exserted or included within the throat of the corolla. Stigma bifid. Berry drupaceous, containing 2 nuts, crowned with the limb of the calyx, usually marked with 10 ribs by drying, sometimes 4-angled and with 4 furrows, sometimes even. Nuts chartaceously coriaceous, ribbed, angled or even, 1-seeded. Seed erect, with a cartilaginous solid (not ruminated) albumen. Trees or shrubs, rarely herbaceous plants. Leaves opposite, petioled. Peduncles usually terminal. Flowers panicled or corymbose.—*W. and A. Prod. p.* 432.

These two genera are, in my opinion, part and parcel of the same, the former only constantly differing from the latter in one point, of all those enumerated in these two long characters—that one point is stated in these few words under *Grumilea*, "Albumen somewhat cartilaginous, grumose." Beyond that there is not a single character assigned to *Grumilea*, that is not to be found among the numerous species of *Psychotria*. For these reasons, I have come to the conclusion that the two genera ought to be united, and I therefore club them together here, considering them but one.

The species are all shrubs, many of them very handsome, not on account of their flowers, which are generally small, and so much concealed among the leaves, as to be little conspicuous, but on account of their compact form and bright shining foliage. In this point of view, the *Grumilea* is a shrub well deserving a distinguished place in every ornamental shrubbery, as it might, on the hills, supply the place of the Holly in English gardens. The *Psychotria* is also a pretty shrub, but according to my taste, not equal to the other.

There are two species of Grumilea currently met with on the Hills, and so very like each, that they may easily be mistaken for each other, as they are only distinguishable by the inflorescence, the one, namely, here represented and another which I have called *G. elongat.*, in reference to the flowers which form an elongated panicle like cyme. I introduce the distinctive characters of both to prevent their being confounded.

I shall conclude these general remarks on the two genera which perhaps I should have united under the older name by appending a few observations extracted from my Icones just published.

"OBS. These two genera *Grumilea* and *Psychotria* ought to be united as they are truly one in every thing except the ruminated albumen of the former; a character, which, however good in a mere carpological system, is too limited for a vegetable one (which requires its generic characters to be taken from more organs and structures than one) as it can only be made out from ripe seed. If both are preserved, I believe, I may almost predict that probably half the present genus *Psychotria* must ultimately be transferred to *Grumilea* and then, without specimens furnished with ripe fruit no man can tell whether an unknown species belongs to the one or other genus. Our P. *bracteata* I feel certain will, when the ripe seed is found, prove a *Grumilea*: Wallich's P. *truncata* I am all but certain is a *Grumilea*, and I think identical with our *G. congesta*—Genera in a natural system surely ought not to rest on a solitary character, unsupported by habit, and still less so when that is only to be found in the ripe seed which, as distinct from *Psychotria*, is certainly the case with *Grumilea*."

GRUMILEA ELONGATA (R. W.) shrubby glabrous: leaves short petioled, obovate oblong, cuspidately acuminate: penninerved; becoming yellowish in drying: stipules caducous, ovate oblong, broad pointed, cymes elongated, panicle-shaped, compact when in flower, enlarging somewhat in fruit: calyx limb minutely 5-toothed: tube of the corolla short, throat closed with hairs: style embraced at the base by a thick convex fleshy disk, stigma exserted, dilated, 2-lobed.

GRUMILEA CONGESTA (W. and A.) erect: leaves short petioled, oblong, acuminated at both ends, penninerved becoming yellowish by drying: stipules broadly triangular, cuspidate, caducous: corymbs sessile, at first compact and scarcely longer than the stipules, afterwards larger but also compact or rarely spreading when in fruit, naked: calyx-limb somewhat bluntly 5-toothed: tube of the corolla short, scarcely longer than the calyx-limb: berry ovoid, not furrowed.—*W. and A. Prod. p.* 432.

Both are frequent in the woods about Ootacamund, I also possess specimens of the latter from several other stations, Courtallum, Shevagherry, &c. They are unquestionably very nearly allied to each other, but are, I think, abundantly distinct species, as well

by character as habit; the two bushes, even when growing side by side, generally flowering at different seasons. The flowering season of the latter is the autumnal months, that of the former the spring ones.

PSYCHOTRIA BISULCATA (W. and A.:) shrubby, diffuse, glabrous: leaves with a short petiole slightly dilated at the base, oblong-lanceolate, tapering at the base: stipules triangular-acuminated, caducous: corymb terminal, pedunculed, small, few-flowered, trichotomous or with the primary rays in fives, with minute acute bracteas subtending the ramifications: calyx-limb 5-lobed; lobes roundish-ovate; tube of the corolla bearded in the throat, about twice the length of the calyx-limb: filaments exserted; anthers oblong: stigma nearly included, short and thick, bipartite: berry ovate, 4 furrowed by drying: seed and albumen flat on the inner side, with two deep dorsal furrows and an intermediate broad blunt ridge.—*W. and A. Prod. p.* 434.

In woods about Ootacamund but rather sparingly. The leaves are of a light lively green, and dry almost unchanged in colour.

COFFEA.—COFFEE.

Calyx-tube ovate, globose or turbinate; limb small, 4-5-toothed. Corolla tubular, infundibuliform; limb spreading, 4-5 partite, the lobes oblong: æstivation twisted. Stamens 4-5, inserted on the summit or middle of the tube, exserted or included. Style bifid at the apex, the lobes rarely cohering. Berry umbilicated, naked or crowned with the calyx-limb, containing two somewhat parchment-like 1-seeded nuts. Seed convex on the outer side, flat and marked with a longitudinal furrow on the inner. Embryo erect in a horny albumen; radicle teretæ, obtuse; cotyledons foliaceous.—Trees or shrubs. Leaves opposite. Stipules interpetiolar.

This character is adopted from DeCandolle, except what we have added relative to the æstivation of the corolla: we fear it is not sufficient to distinguish the genus from several others; and moreover it is exceedingly doubtful that several species, of which the fruit is unknown, do accord with it: the anthers in all the specimens we have seen are long-linear.—*W. and A. Prod. p.* 435.

This is an extensive genus of fine flowering shrubs including fully 50 species. It seems doubtful however whether its limits are well defined. DeCandolle remarks the probability of its requiring to be divided, while Dr. Arnott in the above note doubts whether the characters are sufficient to distinguish it from several others. Be that as it may it seems sufficiently certain that, as regards the flora of Southern India, it is sufficiently distinct, at least if I am correct in referring here the two species described below, which I see no very obvious reason to doubt as they correspond well with one exception with the character, the exception being the clavate not bifid stigma and that I cannot consider of sufficient importance to nullify all the rest, especially on considering that they do sometimes cohere. Assuming then, which I think I may safely do, that both are true Coffeas, there can be no difficulty in distinguishing this genus from all the others yet found in this part of India by the above generic character whether adequate or not as applied to the flora of the world.

The genus as at present constituted occupies a very wide range—Africa, Asia, and America—both North and South—claim indigenous species, but all confined to the warmer regions, either actually within the tropics or within a few degrees of either side. In Mexico, Brazil, and Peru they abound—there are several from Africa while India and her islands claim about ⅓ of the whole number. On the properties of Coffee I conceive it quite unnecessary to offer any remark, but it may be observed that the Coffea Arabica is the only one which contributes towards the support of man, and it, history informs us, has been in use as an aliment from a very ancient date, as records actually exist proving its use in Persia in the 8th century of the present æra, how much earlier it is impossible to say, and in the middle of the 16th century its use had become so far introduced into Europe that Coffee houses were established for its sale in both Paris and London. Now it has become almost a necessary of life all over Europe, the Western portions of Asia, and adjoining provinces of Africa, and it is much to be desired that its greater abundance in India enabled it to supersede the deleterious Toddy, so generally consumed by nearly all the lower classes of Hindoos.

Let us hope therefore that this much to be desired result, which is already in progress, may soon be brought about by the activity of commercial enterprize so keenly embarked in the production of Coffee.

COFFEA ALPESTRIS (R. W.) shrubby, glabrous: leaves lanceolate, cuneate towards the base, pointed, coriaceous: peduncles axillary, confined to the upper leaves, longer than the petioles, aggregated, forming terminal corymbs: corolla five cleft; divisions much longer than the tube, lanceolate, obtuse: anthers exserted style: gibbous near the base, hairy: stigma clavate, glabrous; berry oval 2-seeded.

Ootacamund in woods flowering March and April. A low very ramous shrub the branches nearly naked, the ramuli covered with closely approximated coriaceous shining leaves: pedunclos confined to the terminal axils, generally about 3-flowered; flowers white with a hairy throat and line of hairs extending along the segments of the corolla.

Coffea grumelioides (R. W.) shrubby or subarborenus, glabrous: leaves obovate cuneate, shortly and bluntly acuminate, coriaceous: pedunclos axillary, confined to the upper axils, about 3-flowered, forming terminal corymbs: corolla 5-cleft, throat hairy, divisions oblong elliptic obtuse; anthers exserted: style not gibbous: stigma clavate, slightly cleft at the apex: berry ovoid, crowned with the persistent calyx.

A large shrub or small tree, in low woods by the road side going to Pycorah, flowering in February. This seems to be a rarer species than the preceding and is confined to a lower range of elevation. Though in many respects like *C. alpestris* this is certainly a distinct species.

GALLIUM.—*Bedstraw, Cleavers, &c.*

Calyx-tube obovate-globose or oblong, with scarcely any limb. Corolla 4- (very rarely 3-) partite, rotate. Stamens short. Styles 2, short. Fruit didymous, roundish, rarely oblong, dry, composed of 2 indehiscent 1-seeded mericarps.—Herbaceous branched plants. Leaves with the stipules forming a verticil.—*W. and A. Prod. p.* 442.

I mentioned above that Dr. Lindley proposed separating the section Stellatæ including *Gallium*, *Rubia*, &c., from the rest of the order, and elevating it to the rank of a distinct order, mainly on the grounds of the plants composing it not having stipules, but in their place verticels of leaves. He has not succeeded in persuading other Botanists to adopt this view, as they object that all except two of the leaves of the whorl are in fact stipulary appendages, since they, however much they resemble leaves in form and appearance, are not truly such being destitute of axillary buds. This objection has scarcely been met by Dr. Lindley. He argues thus—"The only ground on which this is intelligible is that taken by DeCandolle and others who consider the apparent leaves of *Stellatæ* to be in part true leaves, and in part leaf-like stipules. To this verbal but not real distinction there is this objection, which I conceive quite fatal to it. If part of the leaves of each whorl of Gallium were stipules, they must bear a certain proportion to the true leaves; suppose the whorl to consist of two leaves, each will have two stipules, and consequently the whole number of parts in the whorl must be six, and in all cases the number must be some power of three." Such not being the case in nature, he considers "an incontrovertible proof that the apparent leaves of *Stellatæ* are true leaves and not a modification of stipules." To all this of course the simple answer is, if they are leaves, where are their axillary buds which all true leaves have? if not, why should not their number vascillate as readily as the number bristles on the stipules of a *Spermacoce* or *Hedyotis*.

So far as Dr. Lindley has carried out his answer to DeCandolle's "verbal distinction," it can only be viewed as special pleading, as he has failed to prove by any decisive mark, that the apparent leaves are true ones, nor has he shown that viewed as stipules their number might not vary the same as the number of bristles in *Spermacoce*, which, if they became developed, might in like manner assume the form of leaves.

Such was the state of the question when the late Mr. Griffith took it up, and by showing that the apparent corolla is simply a coloured dilatation of the calyx, and that there is in fact no corolla, established on something like reasonable grounds, the correctness of Lindley's view in severing this section from the rest of the order, which Lindley has certainly failed in doing for himself. According to Mr. Griffith's views of its structure *Galiaceæ* or *Stellatæ* should rank near *Nyctagyneæ*, in the monochlamedious class of DeCandolle.

The genus *Gallium* is one of great extent, including in all about 200 species, and is truly cosmopolite, being found in all parts of the world, but is rare in the tropics. In India, the very few species we have are all alpine, and of little interest or value, unless perhaps in connection with the Botanical question we have just been discussing.

The genus *Rubia*, one of this tribe, has 2 species which are valuable as yielding excellent red dyes—namely, *R. tinctorum* the Madder of Europe, and *R. cordifolia* the manjettie of the Tamools. The latter is abundant on the slopes of the Neilgherries and might be collected in vast quantities with little trouble or expense and, as I believe it bears a high price in markets where its value is known, might yield a profitable return to speculators in that article.

GALLIUM REQUIENIANUM (W. and A.:) perennial: stems diffuse, ascending, branched, and the branches 4-angled, clothed with much soft spreading or deflexed hair, when old more glabrous: leaves in fours, roundish-obovate, mucronate, 3-nerved; upper sides sprinkled with hairs; under more copiously hairy, particularly on the nerves and margin: peduncles axillary or terminal, few flowered, trichotomous, hairy: divisions of the corolla roundish-ovate, slightly hairy on the outside: fruit roundish, hispid with hooked bristles.—*W. and A. Prod. p.* 443.

This is a low growing procumbent plant which, but for the large patches it forms, would be but little conspicuous from the grass among which it grows. I believe it is in flower the greater part of the year.

I copy the following note from my Icones, No. 1042, as bearing on the question above adverted to.

"The late Mr. Griffith was of opinion that the Stellate division of Rubiaceæ were misunderstood and erroneously described in calling the yellow petaloid part of the flower, a corolla. That, he once stated to me in a letter, he considers merely the coloured dilated calyx limb. I have since often examined the flower with reference to that view of its structure, but have scarcely been able to satisfy myself that there is not both a calyx and corolla. The Draftsman seems here to have settled the point in Mr. Griffith's favour. He knows nothing of Botanical opinions or theories, but sets down what he sees, and here he has assuredly given no corolla, and I think he is right; in which case this section must, as Lindley has done, be elevated to the rank of an order and will stand in the same relationship to *Spermacoceæ* that *Nyctagineæ* does to *Plumbagineæ*."—*Wight's Icones, No.* 1042.

SPICILEGIUM

NEILGHERRENSE;

OR

A SELECTION

OF

NEILGHERRY PLANTS,

DRAWN AND COLOURED FROM NATURE,

WITH

BRIEF DESCRIPTIONS OF EACH; SOME GENERAL REMARKS ON THE GEOGRAPHY AND AFFINITIES OF NATURAL FAMILIES OF PLANTS, AND OCCASIONAL NOTICES OF THEIR ECONOMICAL PROPERTIES AND USES.

BY

ROBERT WIGHT, M.D., F.L.S., &c.

MEMB. IMP. ACAD. NATUR. CURIOS.: ROYAL RATISBON BOT. SOC.: EDINB. BOT. SOC.: CORR. MEMB. HORT. SOC.; SURGEON MADRAS ESTABLISHMENT.

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THE END.

COMPOSITÆ.

By far the largest order of the vegetable kingdom and the most widely distributed of the Dicotyledonous division. Of species, there are already known and described, nearly, if not fully, 10,000, derived from every quarter of the known world, from the Equator to both polar circles and from the level of the ocean almost to the line of perpetual congelation. But though thus general they are far from being equally distributed as regards the proportion they bear, in each region, to other plants. In France they are estimated to amount to about 1 in 8 : in Germany, 1 in 15 : North America, 1 in 6 : Sicily, 1 in 2 (?): Tropical New Holland 1 in 23, &c. In India they probably amount to about 1 in 20 and on the Neilgherries to about 1 in 15. These estimates are however only approximations, but are sufficiently near to show the general predominance of the family over all others, which is still more conclusively established by the better ascertained fact of their species constituting about one tenth of those of the whole flowering vegetation of the earth.

A family of such vast extent and at the same time so very natural has engaged much of the attention of Botanists with a view to its subdivision in such a manner as will facilitate the investigation of its species by grouping them in well defined and naturally disposed tribes and genera. Great progress has undoubtedly been made in this work, especially in the monograph of the late most excellent Professor DeCandolle who devoted nearly 10 years of his valuable life to the completion of that most arduous undertaking, carefully availing himself, throughout, of the labours of his predecessors. But much as he has accomplished it cannot be doubted that much remains to be effected before it can be admitted that even an approximation to perfection has been attained. The family as a whole, may be said to be, one of the most easily recognized of the vegetable kingdom: as regards the Indian Flora this is certainly the case, there being only one genus (*Xanthium*) of our Flora referred to it, about which any one, previously acquainted with [illegible] species, could entertain a doubt and it cannot, I think, be admitted as a true congener.

The marks by which Compositæ are distinguished are few in number and generally easily made out—Flowers in heads, surrounded by an involucrum. Florets, seated on a receptacle, furnished with a variously formed pappus calyx, but which is sometimes obsolete or wanting. Corolla superior, monopetalous, lobed, the lobes furnished with marginal veins,

æstivation valvate. Anthers usually cohering by the margins forming a tube round the style. Ovary 1 celled with a single erect ovule. Stigma usually 2 cleft. Numerous other particulars appertain to them, but these are the essential peculiarities of the order. They however, require to be taken together as each, viewed separately, may be found in other families but never all together. For example, many plants have capitate inflorescence and some have their florets bound by an involucrum as in true *Compositæ* and even a pappus calyx, as *Dipsaceæ*, but they want the venation of the corolla and its valvate æstivation, the usually cohering anthers and erect ovules. *Lobeliaceæ* have cohering anthers but differ in every thing else. Many families have valvate æstivation of the corolla but are deficient in other characteristics. Solitary erect ovules are also met with but uncombined with the other marks. It thence follows that this is usually a very distinct and easily recognised family not liable to be mistaken for any other.

In Geographical distribution its predilections are in respect to temperature, very decidedly temperate, comparatively few being found within the tropics, though they abound in the warmer latitudes just beyond. The Indian Flora is estimated to include about 700 species for all India. The Neilgherries alone have nearly 100, while the plains from Cape Comorin to Ganjam can scarcely furnish an equal number and many of these, being drawn from the vegetation of the lower ranges of hills, belong to the Subalpine rather than Champaign Flora. A family embracing so many species must almost necessarily furnish many plants both highly ornamental and useful to man. Our flower gardens abound with the former, including Chrysanthemums, Zinnæas, Everlastings, Asters, Sunflowers, Coriopsids and a thousand others, but especially the magnificent Dahlia which takes unquestioned precedence of all others; the finer varieties of which can scarcely be excelled, when well cultivated, for richness of colouring and ornamental effect in the well disposed parterre. The number of species which it contributes to the economical purposes of man is scarcely less considerable. The common garden Lettuce and Endive are among the best known of these, but the Artichoke, Cardoon, Jerusalem Artichoke, Salsafy, &c. &c., are all much cultivated as esculents. The flowers of some yield pigments: the seed oils of fine quality. A vast number are used in medicine for the cure or alleviation of numerous diseases, and among them a very few only are known to be possessed of acrid or virulent properties, of these *Arnica montana*, a Swiss plant, known in English gardens under the name of Mountain Tobacco, is the most conspicuous. Many are intensely bitter combined with aromatic properties, hence, possessing tonic and febrifuge virtues. But on these it would be out of place to dwell in this work.

Various arrangements have been proposed to facilitate the investigation of species of this most natural family of plants, hitherto with but indifferent success. I shall here confine myself to a brief explanation of the last, that of the lamented DeCandolle, as being the one according to which the few species introduced into this work are distributed. He divides the whole family into three primary groups or classes.

1st. TUBULIFLORÆ having the bisexual or hermaphrodite flowers tubular. Those of the ray, when present, are usually female and to that extent imperfect and abnormal.

2nd. LABIATIFLORÆ having the hermaphrodite flowers, divided into two lips—Of this division the Neilgherry Flora furnishes no representative.

3rd. LIGULIFLORÆ all the flowers hermaphrodite, with the petals split along one side, resembling the ray florets of the first class or suborder. These primary divisions again are divided into 8 tribes, namely.

1. *Vernoniaceæ* style cylindrical, its arms long and subulate, occasionally short and blunt, covered all over with bristles.

2. *Eupatoriaceæ* style cylindrical, its arms long and clavate with a papillose surface on the outside near the end.

3. *Asteroideæ* style cylindrical, its arms linear flat on the outside equally and finely downy on the inside.

4. *Senecioniderc* style cylindrical its arms linear fringed at the point, generally truncate, but sometimes extended beyond the fringe into a cone or appendage of some sort.

5. *Cinareæ* style thickened upwards and usually fringed at the tumour.

6. *Mutisiaceæ* style cylindrical, somewhat tumid near the apex, its arms usually blunt or truncated, very convex on the out side, and covered, at the upper part, with fine uniform hairiness, or absolutely bald.

7. *Nassauiaceæ* style never tumid branches long linear truncate fringed only at the point.

8. *Cichoraceæ* style cylindrical branches linear truncate equally pubescent. These tribes are again subdivided into subtribes and divisions.

This arrangement is ingenious and often succeeds in bringing together very natural groups, but seems to me to labour under the disadvantage of being constructed on too narrow a foundation, a few, and these often almost inappreciable, variations of the style and stigma seem scarcely sufficient for the support of such a gigantic superstructure as is raised upon them, the more so, as but little practice is required to furnish exceptions, not easily got over, in every tribe. It is however the last method which has been proposed and what is of perhaps greater weight we have now a complete monograph of the order constructed on it, whence, for the present at least, it is generally adopted by Botanists. And they are under very great obligations to the late accomplished professor DeCandolle for his untiring application in reducing to regular form that which, previous to his labours, was a perfect chaos. It must not however be overlooked that the original plan did not originate with him, but with Cassini and Lessing, especially the latter, whose divisions he has closely followed in the arrangement of his materials. In working out these it seems to be the general opinion of Botanists that he has needlessly multiplied genera, an error not at all times easily avoided, but not on that account the less to be regretted, as the example of so great a proficient in the science can scarcely fail to be extensively followed by the less competent observers.

When writing an account of this family for publication in my Illustrations of Indian Botany I made a list of all the genera found in India and with them prepared a "synopsis of the genera of Indian Compositæ" In this synopsis the characters are some-

what abbreviated and the arrangement of their parts considerably modified. DeCandolle's arrangement commences with the Capitulum followed by the Involucrum—Receptacle—Corolla—Stamens—Achœnium (seed)—Pappus—and the natural character of the plant. The peculiarities of all these parts are more or less fully described in each character while in fact the really essential points, after the sectional ones, are usually derived from the capitulum, achœnium, and pappus. In this way many peculiarities not essential to the recognition of the genus, and liable to perplex the student, are admitted into the character, by which it is often greatly lengthened without obtaining any commensurate advantage. To avoid the perplexity which such a plan occasionally involves I have commenced mine with the capitulum, followed by the achænium and pappus as supplying the really essential points of the character. These again are followed by the natural character or habit of the plant including the involucrum, receptacle and flowers. In this way no point of even minor importance is overlooked while marked prominence is given to those which are really essential. The generic characters adopted in this work are those of the synopsis with such additions as may from time to time seem desirable.

TRIBE I.—Vernoniaceæ.

This tribe is for the most part recognised, at first sight, by its homely, I had almost said, weed-like aspect, the capitula being generally without ray or ornament of any kind, and the flowers without brilliancy of colouring. It now includes between 60 and 70 genera six or eight of which have Indian representatives. The flowers are tubular, equally 5 cleft, with the longish deeply cleft style projecting from the throat, extending its long cylindrical arms on either side. Of the Indian species, the colour is usually a, more or less deep, lilac hue. The pappus is generally rigid and seen under a magnifier rough. The receptacle is either alveolate or beset with bristles, the whole inclosed by a many scaled imbricated involucrum.

Subtribe—Vernoniee *capitula discoid homogamous.*

Div. Euvernoniese—*anthers ecaudate involucrum, not compressed,* polyphyllus.*

VERNONIA.

Capitulum usually many flowered. Achenia with a cartilagenous callus at the base and a large epigynous disk. Pappus usually a double series, the interior one bristly much longer than the palaeaceous outer one. Herbs, shrubs, or trees: leaves alternate often glandulose: involucrum imbricated, interior squamæ longest: receptacle naked or rarely fimbrillose: flowers few or many: corolla regular, 5 cleft, usually purple or rose coloured, filaments smooth.

This genus is one of great extent 290 species being defined in the 5th volume of DeCandollis prodromus and, since the publication of that volume 10 years ago, so many species have been added that I imagine the number of published species now exceeds 350, upwards of 30 of which are natives of India. In America they are much more numerous but do not seem in either country to merit much considertion as I do not find any notice taken of any of the species in works treating of the useful properties of plants. One Indian species *V. anthelmintica* is held in repute in this country as a remedy for worms, as the name implies, but I have never known it used though sufficiently common and easily procured. As ornamental plants they merit but little regard the one figured in this work being about the best looking of those found in this part of India and it must be confessed that, as seen growing, it has a very weed-like appearance little likely to obtain favour in the eyes of the lover of fine flowers.

* This is in contradistinction to another division in which the capitula are somewhat flattened.

This genus is very nearly allied to the following, which is distinguished by the pappus of this being in a double series in that a single one with 10 ribbed achænium. Whether generic value ought to attach to points of such apparently small importance may be questionable, but still as they provide the means of somewhat reducing an overgrown genus they are not likely to be objected to in this instance whatever may be the case, in others where the necessity of employing such is less urgent.

VERNONIA PECTENIFORMIS (D. C.) shrubby, branches teretesmoothish, younger ones angled, pubescent: leaves short petioled, ovate lanceolate, acuminated, pectinately and deeply serrated, membranaceous; glabrous above pilose beneath: cymes terminal, corymbose, naked: capitula long pedicelled, many flowered, ovate: scales of the involucrum dry, glabrous, ciliated, ovate-oblong, obtuse or subacute, mucronate, tipped with brown.

Neilgherries not unfrequent in clumps of Jungle.

Decandolle defines what he states to be two very nearly allied species under the names *V. pectenata and pectenifornis* the one from the Neilgherries the other from the Pulney range. I have specimens from both stations and after a careful comparison confess I am unable to discover specific differences: and therefore infer one of them must be reduced. Under these circumstances I ought, perhaps, to have adopted the Neilgherry name, *V. pectenata*, but was induced wrongly, I now fear, to adopt the other, partly on account of seniority, it being the older of the two by 2 years, but principally because having compared it with an authentic specimen of *pectenifornis* I found them, I think, identical and feeling therefore pretty sure that the specimen figured is truly the plant whose name it bears, I without further consideration at the moment adopted it. It was not until more than a year after, when arranging the materials for this work, that I was led to reconsider the matter and now think that I have erred in preserving the present name which is dependent on the other. The plant is sufficiently common about the outskirts of "scholahs" especially where the soil is somewhat humid.

DECANEURUM.

Capitulum many flowered. Achænia usually glabrous marked with ten prominent ribs. Pappus one series, bristles thick, rigid, densely barbellate. Herbaceous or suffruticose plants, leaves alternate: involucrum imbricated many series often surrounded with foliacious bracts: capitula usually solitary terminal: receptacle flat alveolate: flowers regular 5 cleft, purplish.

This as compared with the last is a small genus including only 14 or 15 species, all of tropical origin and for the most part Indian. Four however of those described by DeCandolle are from Africa, two Continental, one from Madagascar and one from the Island of Bourbon. The Moluccas furnish one and Ceylon two. Judging from the wide geographical range which this small genus occupies, it seems probable that further researches in Africa will bring many more to light. The Indian peninsula produces two in addition to those known to DeCandolle from this region, one new, which I have figured in my Icones under the name of *D. Courtallense*, and another, which may also be new, but which I consider *D. Silhetense* D. C., and have published, in the same work, under that name. The Neilgherries furnished two or probably three species. The one selected to represent the genus though not a showy plant is not altogether unornamental, and probably under cultivation might be improved were it not that it is almost aquatic in its habits, being always found in wet or even marshy ground. Of the properties of the genus nothing is yet known. It was first established in 1833 by DeCandolle and published in my "Contributions to Indian Botany:" recently the priority of the name has been disputed in favour of another, which claims to be of older date, which it would appear had been overlooked by the professor when naming this genus, a circumstance the more remarkable as it also belongs to a composite plant.

DECANEURUM RETICULATUM (D. C.) stem suffruticose, erect, ramous, every where rough with bristly hairs: leaves sessile, ovate, mucronate, and mucronately sub dentate; rough above, densely whitish tomentose beneath; nerves and veins scabrous reticulated: peduncles few, axillary and terminal, capitula closely embraced by numerous foliacious bracts; interior scales of the involucrum scariose, glabrous, longer than the bracteas.—*D. C. Prod. 5 p. 866.*

Neilgherries, frequent on the banks of streams all over the hills, and in flower nearly all the year; but in greatest perfection from June to September. Plant from 2 to 4 feet high flowers purple.

The specific name is descriptive of the under surface of the leaves which is very pale or whitish netted all over with darker coloured veins, very conspicuous in the dry specimen, the state in which it was seen when named. The generic characters are well developed in this species which therefore is a favourable one for studying them.

MONOSIS.

Capitulum one flowered. Achœnea glabrous terete. Pappus 2, 3 series, bristles rigid scabrous. Trees or shrubs: leaves alternate: panicles naked, the ends of the branchlets bearing subumbellate sessile capitula: scales of the involucrum imbricated, obtuse, shorter than the solitary flower: corolla rose coloured.

This genus was constituted in 1833 for the reception of the plant here represented and named with reference to the solitary flower of each capitulum. Two additional species from Mexico were subsequently added, and a third is doubtfully referred to the genus by DeCandolle. Two more have since been added, one from Mexico the other from Brazil, found by Mr. Gardner. The latter more nearly associates with the Indian species than the Mexican ones, being referable to the same section of the genus.

The Neilgherry plant differs from the American ones in its arborous, habit, often attaining 40 or 50 feet in height with a stem upwards of 2 feet in circumference. It is abundant on the eastern slopes below Coonoor and Kotergherry, and when in flower, as well as when the seed is approaching maturity, a very conspicuous object owing to the large panicles which terminate each branch. The leaves are large, obovate, somewhat pointed, strongly transversely ribbid and of a coarse rigid texture not unlike those of the teak.

The remarkable peculiarity of this genus, that of having only a single floret in the involucrum, is so far as I am aware only met with in two or three other genera in the order (*Silausia*) being one: that also is referable to the same tribe along with another having only two. Many genera have few flowered capitula, but there are very few examples where syngenesious plants lose their aggregate character by having single flowered capitula with many scaled involucra.

MONOSIS WIGHTIANA (D. C.) Arboreous, branches terete, velutino-tomentose: leaves petioled obovate subacute, cuniate and obtuse or subcordate at the base, entire, penninerved, glabrous or somewhat velvetty on the nervos above; velutino hirsute beneath: panicle very ramous, capitula sessile at the apices of the subcorymbose ramuli: scales of the involucrum obtuse, tomentose on the back.—*D, C. l. c. p. 77.*

A large tree, abundant on the Eastern slopes of the Neilgherries below Coonoor. On the sides of the deep dell leading down to the bottom of the Catherine falls at Kotergherry there are some noble trees of this species.

It owes its specific name to the circumstance of having first become known through the medium of specimens preserved and sent home with my collections in 1828.

TRIBE III ASTEROIDEÆ.

This is a large tribe including, according to DeCandolle upwards of 170 genera, thirty-one of which have representatives in the Indian Flora. America however is the head quarters of the tribe. There the genus aster is found in all its glory and contributes largely to ornament the flower borders of European gardens. The tribe is distinguished by having the Capitula, usually, heterogamous, namely, female florets in the ray and bisexual ones in the disk; sometimes they are homogamous, that is, having all the florets uniformly bisexual, or monoicous and occasionally they are dioicous, all males on one plant and all females on another. The Styles of the hermaphrodite flowers are cylindrical above and bifid with longish linear somewhat flattened, often subacuminate, rarely obtuse branches; externally minutely perberulous. The Stigmatic lines of glands are slightly prominent, extending to the origin of the external pubescence. The Corolla pellucid, staminigerous, tubular, regularly dentate. The pollen globose echinulate. From these characters it would appear that the tribe, if really a natural one, presents considerable diversity of form and structure of the flowers, but all bound together by the uniformity of character presented by the style and stigmas. In the subdivision considerable importance is attached to the colour of the flowers, namely, whether homochromous, the disk and ray of the same colour or heteroch-

rous of different colours. The anthers also afford sectional characters, according as they are prolonged downwards forming a kind of tail, caudate or ecaudate; so also the receptacle, whether naked or chaffy (paliaceous) and the leaves, whether opposite or alternate, all of which as well as others not noticed are wanted in discriminating the genera of this large and very difficult tribe.

Sub-tribe. *Asterinæ, capitula homo or heterogamous usually radiate. Anthers ecaudate. Leaves almost always alternate.*

ERIGERON.

Capitulum one flowered radiate, Ligulæ linear female, several series: disk flowers tubular, either all bisexual or with the exterior ones female. Achænia compressed beakless. Pappus one series.—Herbaceous or suffruticose plants: leaves alternate: capitula hemispherical: involucrum two or three series: receptacle naked foveolately punctuate: flowers of the ray white, blue or purple; of the disk yellow.

Of this large genus including nearly 100 species a few only, about 10, are natives of India and nearly equally divided between the plains and mountains; but upon the whole it is an extratropical genus, the plurality of its species being natives of North and South America beyond the tropic and those found within these limits being, for the most part, alpine; a few are found in Europe. The one here represented is very common on the Hills and to be met with at almost all seasons, but especially in the earlier months of the year, after the rains, in almost every moist pasture. DeCandolle has described another species as occurring on the hills under the name of *E. Leschenaultii*. The differences in the character of the two plants are so slight that I cannot divest myself of the belief that the two form but one species and that the differences indicated are referable rather to individual specimens, than distinct species. The specimen of *E. Wightii* sent to DeCandolle was an indifferent one, those of *E. Leschenaultii* might have been better, but a comparison of this plant with the original specimen of *E. Wightii*, leaves scarcely a doubt on my mind of these being scarcely varieties of the same species; and as this is the only one found on the Hills at all corresponding with DeCandoll's character of *E. Leschenaultii*, presume that one of these names may be suppressed. The original specimen of *E. Wightii* is somewhat more hispid and the peduncles shorter, but then it is clearly less luxuriant and had grown in a drier less fertile soil. I am thus particular in directing attention to the circumstance of two nearly allied species being supposed natives of the hills in the hope that others, having better opportunities, may be induced to examine the subject with the care necessary towards arriving at a correct conclusion. The flowers of *E. Leschenaultii* are said to be white of *E. Wightii* purple, an obvious mark which may materially assist the enquirer.

ERIGERON WIGHTII (D. C.) stem erect shortly ramous: leaves oblong, the inferior ones attenuated at the base, subserrated, somewhat obtuse; superior ones entire, acute, all puberulous on both sides: capitula, pedicelled sub racemose: scales of the involucrum rough on the back, linear subulate, equaling the disk: ligulæ very slender, longer than the disk: achænia glabrous.—*D. C. l. c. 5. 286.*

On the Neilgherries not unfrequent in moist pastures, flowering during the rainy season. Ligulæ pale purple several-series, branches hispid, plant greyish white.

If there are indeed 2 species I now think, so far as I can make out from description, that this of the two agrees better with *E. Leschenaultii* than *Wightii* though it has the purple flowers of the latter.

MYRIACTIS.

Capitulum heterogamous. Flowers of the ray two or many series female; ligulæ very narrow: of the disk hermaphrodite. Achænia compressed beakless often glanduliferous at the apex. Pappus none.—Erect, dichotomously ramous herbs, with alternate leaves: peduncles long 1-cephalous paniculate: capitula globose: involucrum 1-2 series: receptacle naked flowers white or yellow.

This small genus of six species is exclusively of Asiatic origin, three species being found in India, two in Java, and one in Persia. I am only acquainted with the present one, which is sufficiently common on the

hills, growing in dry pastures. Some specimens I have seen, growing in arid rocky ground, were so reduced in size that at first sight they appeared to be Daisies and were of course eagerly appropriated and greatly prized until closer inspection showed the mistake. The difference between them and the specimen figured was much greater than between the two plants referred to in the preceding article and, probably, had they been sent as distinct species to even so acute and skilful an observer as the late professor DeCandolle, might have deceived him. The figure gives a good idea of the form of the plant but an indifferent one of the flowers which are white.

MYRIACTIS WIGHTII (D. C.) sparingly pilose: inferior leaves ovate with a long cuniate attenuation at the base, coarsely inciso-serrate; the superior ones oblong entire sessile; the apices of the teeth and of the leaves themselves calloso-mucronate.—*D. C. l. c. p.* 5. 308.

Neilgherries not unfrequent in pastures, minute forms of it growing in arid stony ground sometimes resemble the Daisy. "Radicle leaves ovate attenuated into the petiole, the inferior cauline ones cuniate at the base, sparingly dentate, the upper ones subsessile acuminated at both ends: capitula terminal solitary, 4-6 lines in diameter: involucrum somewhat hairy reflexed after blooming: ligulæ white about 2 series becoming revolute in drying."—*D. C.*

Sub-tribe Baccharideæ *Capitulum heterogamous or dioicous never radiate all the florets tubular; usually several series of female ones in the circumference. Anthers ecaudate: receptacle epaliaceous. Leaves alternate.*

The plants composing this sub-tribe are most unlike those of the preceding and might, at first sight, well give rise to doubts regarding the propriety of the arrangement which places them in their present situation. A closer examination, however, shows that the discrepancy is more apparent than real. Here as in the *Asterinæ* we have two distinct sets of flowers the females in the circumference and the male or hermaphrodite ones in the centre, so that, in so far, the difference is mainly in the form of the female flowers, tubular here ligulate there; but the style and stigmas correspond. The same tubular forms of ray flowers are found in the next sub-tribe, but in the subsequent ones *Inulæ* and *Eclipteæ* the radiate forms return, thus forming a circle combining what, upon the whole, appears a very natural group.

DICHROCEPHALA.

Capitulum heterogamous. Flowers all tubular: marginal ones female many series; 3-4 toothed; central ones, hermaphrodite or male, few; 4-5 toothed. Achænia compressed beakless, of the females bald of the males and hermaphrodites crowned with one or two bristles.—Annuals with alternate leaves and few small globose capitula racemosely or paniculately arranged, shorter than the naked pedicels: involucrum, when present, expanding: receptacle naked conical: flowers purplish.

This is a small genus seven species only having as yet been discovered. Two of these are natives of the Neilgherries and five of India. Both the Neilgherry ones occupy a wide geographical range, one being found in Java, China and other parts of India, the other, the one figured, in Java and on the hills. They are easily distinguished by the size of the capitula, those of *D. chrysanthemifolia* being fully double the size, of those of the other, while the leaves of *D. latifolia* are broader and larger than those of this. They are found about houses and neglected places in short pasture, but are little known, having nothing in their appearance to attract notice, they may however, be viewed as Botanical curiosities.

DICHROCEPHALA CHRYSANTHEMIFOLIA (D. C.) erect ramous, the whole plant rough from close set short hairyness: inferior leaves lyrately pinnatifid; the superior ones oblong, cordately semiamplexicaul, coarsely serrated; the upper ones entire: pedunculos much longer than the capitula.—*D. C. l. c.* 5. 372.

Frequent on the Neilgherries about road sides and in neglected places, apparently in flower most part of the year.

The little coloured glands on the outer surface of the corolla deserve notice here as does the calicine rim of the achænia, as showing that the long pappus of other species of the order, of which this is a modification, is in truth a realculyx though a very peculiar one.

Sub-tribe Tarchonanthem *capitula either dioicous (male and female on different plants) or heterogamous; never radiate. Female flowers of the circumference many series very slender; of the disk hermaphrodite or male, fewer and larger. Anthers caudate. Leaves alternate.*

BLUMEA.

Captitulum heterogamous. Flowers of the circumference many series truncated, 2-3 toothed, the throat scarcely dilated. Anthers very slenderly caudate at the base. Achænia terete. Pappus 1 series bristles capillary scarcely rough.—Herbaceous plants with panicled or loosely corymbose inflorescense: involucrum imbricated many series, scales linear acuminated: receptacle flat, naked, or sometimes hairy: flowers yellow or purplish.

This is an extensive genus first established by DeCandolle in the Archives Botanique for 1833, regarding which the author remarks. "It includes about 80 species nearly all undescribed. They are natives of India and a few of Africa; I have not yet found any from America. Being obliged to give a new name to a genus so eminently Indian, I have dedicated it to M. Blume, author of the Flora of Java, who himself found many of the species and has rendered great service to Indian Botany. He well merits a more brilliant genus but I hope the great number of species will compensate for the modesty of their aspect."

The genus thus introduced to the notice of Botanists has since then been augmented to nearly 100 species. As remarked by the author, their aspect is certainly modest, but they form an interesting group distinguished from some other nearly allied genera by their terete, not compressed seed, the latter being the distinctive mark of *Conyza*, with which most of the previously described species had been confounded.

The one here shown is not characteristic of the habit of the genus but is well suited to give a good idea of its Botanical characters. It is besides a plant so abundant and so strongly marked in its aspect that it is not liable to be mistaken by any one wishing to study the characters of the genus. I have met with it in other places besides the Hills.

BLUMEA ALATA (D. C.) stem herbaceous erect ramous and, like the leaves, clothed with short redish pubescence: leaves elliptic oblong, dentate, decurrent, forming wings along the stem: peduncles axillary one or few headed, racemosely panicled: capitula suberect: exterior scales of the involucrum lanceolate, foliaceous, squarrose, pubescent; interior linear scariose as long as the flowers.—Flowers purple males 10 or 12.—*D. C. l. c.* 5. 448.

Neilgherries not unfrequent. Of this species there are 2 varieties referred to by D. C β cornua and γ Napalensis. The plant represented belongs to the former—"stems herbaceous erect ramous, like the leaves clothed with short redish pubescence: leaves oblong acuminate, denticulate, decurrent, forming wings along the stem, peduncles axillary 1 or few headed racemosely panicled recurved; capitula cernuous: exterior scales of the involucrum lanceolate, foliaceous, pubescent, the interior ones long shining scariose recurved at the points, at length patent." This species very near *B. cernuoides*, are they not varieties same species differing in the degree of clothing, the one "tota dense velutino hirsuta" the other (*V. alata*) "pube brevi subrufa pubescenti-velutenis."

TRIBE IV.—SENECIONIDEÆ.

This is the largest tribe of the order including, according to DeCandolle's arrangement, no fewer than 388 genera to which many have since been added. Of these 388 only 36 have representatives in the Indian Flora, showing how small a proportion Compositæ bear in India to the rest of the vegetable kingdom. The proportion Compositæ bear to the vascular plants of the world is about 1 to 10: in India they do not quite amount to 1 in 20. In this tribe, the proportion its Indian genera bears to the whole, is about 1 to 10; but I suspect the proportion of species falls short of that ratio. Among its species are to be found some of the most splendid flowers to be met with in the vegetable kingdom, such as the Dahlia, Sunflower, &c. and on the other hand numerous others are as unassuming as these are conspicuous. Among its species too are many of the most useful plants, in an economical point of view, belonging to this family.

The essential distinctions of the tribe lies in its cylindrical deeply cleft style, the arms linear fringed at the point, generally truncate but sometimes extended beyond the fringe into a cone or appendage of some sort. Corolla of the disk pellucid, pollen globose echenulate. These marks unquestionably aid in enabling a beginner to ascertain whether a plant under examination belongs to this tribe, but are too loose and deficient in precision to be of much use until practice has familiarized him with the forms and characteristic features, if I may so call them, of the plants belonging to it, when they are but little regarded. On this point Dr. Lindley justly remarks, "there can be no doubt that the genera are needlessly multiplied; a very little practice tells us that the genera collected under the signs above given do not in all cases exhibit these signs, as is evident from the figures executed under the eye of DeCandolle himself; and we know that, in fact, genera find there place by considerations apart from those ostensibly put forward by DeCandolle."

A reference to the magnified figures of the few genera represented in this work will tend to establish the justice of these remarks.

Sub-tribe Melampodineæ. *Flowers radiated, no hermaphrodities, Male and Female in different plants (dioicous) or in different capitula of the same plant (heterocephalous) or in the same capitulum monoicous: anthers exsudate: receptacle usually paleaceous: pappus never setose.*

As regards Indian Botany this subtribe has very few representatives, three or four being all that is known and one of these, *Xanthium*, scarcely meriting a place in the order, being, as compared with the rest, most anomalous in structure. Of the genus here represented only 2, or at most 3 species are known, one continental and one, or perhaps two, from Ceylon, the native country of the one first described and on which the genus is founded.

MOONIA.

Capitulum monoicous. Flowers of the ray 1 series female ligulate, limb 3 cleft; of the disk male. Branches of the style of the female linear revolute; of the male included simple or slightly cleft at the apex, sterile. Achænia obovate somewhat compressed entire or shortly bicornute at the apex. Shrubs: leaves opposite: peduncles terminal 1 cephalous: involucrum 2 series, the exterior spreading recurved; interior erect: receptacle paliaceous palise membranous 1 nerved: flowers yellow.

This genus was first defined by Dr. Arnott and named in honor of the late Mr. Moon the zealous superintendent of the Ceylon Botanic garden. As above stated, only two, or at most 3 species, are yet known, one or, probably, two from Ceylon and the present which abounds on the Neilgherries, especially about the Avalanche where it is found round the outskirts of every wood, flowering abundantly in March and April, but I believe is in flower at all seasons. There, it is a diffuse very ramous shrub seeking support from its neighbours, though not a climbing plant, and in favourable situations may be met with upwards of six feet high.

MOONIA ARNOTTIANA (R. W.) shrubby, erect, ramous: leaves opposite, unequally pinnatifid, the terminal lobe larger, deeply 3 cleft: pinnæ lanceolate, acuminate, coarsely incisa-serrated, glabrous: flowers of the ray numerous: achænia entire at the apex.—*R. W. Icon.* 1105.

Neilgherries and Pulney mountains in clumps of jungle—on the former, common near the Avalanche Bungalow and in almost every clump of jungle from thence to near Sispurah.

This plant seems not unworthy of a place in the flower garden, many less deserving being already found there. It has nothing common or weed-like in its aspect and it seems highly probable that, grown in dry but rich soil, the flowers would increase in size and number at the expense of the stem and leaves. It would also possess the charm of novelty for though abundant about the Avalanche it is quite unknown about Ootacamund.

M. heterophylla (Arnott) suffruticose? leaves opposite, petioled, entire or biternately divided, with mucronate serratures: flowers of the ray about 5: achænia marginate bicornute at apex. Ceylon.—*Arn. guil. D. C. prod.* 7—269.

Sub-tribe Gnaphaliem. *Capitula homogamous or heterogamous discoid. very rarely radiate, sometimes 1 flowered. Anthers caudate. Achænia crowned with a pilose or setaceous pappus, very rarely bald. Leaves usually alternate.*

To this section the group of Cape plants well known to amateurs in England under the name of "everlastings," belong. They owe their name to the dry chaffy scales of the involucrum, which, in many, are highly coloured and polished presenting almost metallic lustre. And as these remain, retaining the brilliant appearance of the growing plant, long after they have been gathered, the name seems very appropriate. None of the Indian ones merit, the appellation having neither the brilliance nor durability of their cape congeners.

This subtribe is one of great extent including according to DeCandolle's list 80 genera, and it may safely be doubted whether any other division of the order has proved so troublesome to Botanists as this one. The species are numerous and so closely resembling each other that their discrimination becomes a task of great difficulty and nicety, only to be acquired by much patient investigation of every part of the plant. This has led to the extensive multiplication of genera indicated by the above figures very many of these being confined to one or two species. Such being the case it seems almost unavoidable that some if not many of them should rest on characters so indistinct that none but a very practised eye can detect them. For myself I candidly confess that, even with the aid of named specimens and generally good materials, I have felt myself incompetent to detect the limits which separate some of the genera commonly met with on the hills such as *Helichrysum, Gnaphalium, Antennaria* and *Anaphalis*: nor can I help thinking, as the result of my examinations, that were the specimens put into the hands of any other Botanist or even D. C. himself, were he happily still among us, that they would all be again referred to the same genera in which D. C. has left them. The plant here figured is referred to the genus Helichrysum but I cannot discover in what respect; it differs generally from some others named, by the same authority *Anaphalis* and they again pass into others respectively named *Gnaphalium* and *Antennaria*. These circumstances are mentioned more for the purpose of showing the difficulties attending the determination of the genera of this tribe than questioning the goodness of the genera themselves which, to a more practised investigator, may be clear enough, though I doubt my own assumption.

HELICHRYSUM.

Capitulum sometimes homogamous the flowers all hermaphrodite, 5 toothed; sometimes heterogamous the marginal flowers, often very few, 1 series, female. Achænia beakless sessile with a terminal areola. Pappus 1 series bristles roughish not plumose.—Herbs or shrubs with alternate leaves: involucrum imbricated; scales scariose, interior ones connivent or radiant: receptacle flat, epaleaceous, naked, areolate or fimbrilliferous: involucrum white purple or yellow: corolla yellow or purple.

Of this genus DeCandolle enumerates upwards of 200 species, two only of which are found in India; viz. the accompanying and one from Ceylon. Africa is certainly its head quarters; but Europe, Asia and Australia all contribute species, none however has yet been found in America. Many of the Cape ones are remarkable for the brilliancy and rich colouring of their involucral scales.

HELICHRYSUM BUDDLEIOIDES (D. C.) stem suffruticose erect ramous woolly towards the apex: leaves sessile ovato lanceolate acuminate entire, 7—9 nerved, glabrous above whitish tomentose beneath: corymbs compound polycephalous at the apices of the stems and branches: capitula ovate, densely crowded: scales of the involucrum ovel obtuse, about equal, a little longer than the disk.—*D. C. l. c.* 6. 201.

A rather common plant on the Neilgherries forming dense clumps or bushes from 4 to 6 feet high. The white stems and undersurfaces of the leaves contrasting with green upper ones and large clusters of yellow flowers, render this a conspicuous plant. The leaves are from 3 to 4 inches long, 8-10 lines broad: receptacle alveolate shortly fimbrillate: flower of the outer series female or sterile, the rest hermaphrodite: style and stamens included: pappus 1 series pilose scabrous: achænia glabrous.

This handsome perennial attains too great a size to be convenient as a garden ornament, but for the compound that objection does not apply, especially when bounded by clifty rocks, shrubbery or clumps of trees, in such a situations it is conspicuous and ornamental.

CARPESIUM.

Capitulum heterogamous discoid, marginal florets female several series; disk hermaphrodite. Anthers caudate. Branches of the style terete obtuse subglabrous. Achænia oblong compressed rostrate; rostrum beset with viscid glands. Pappus none.—Herbaceous erect plants: leaves alternate: capitula solitary on the ends of the branches: involucrum many series imbricate, exterior ones sometimes foliaceous: flowers yellow.

This is a small genus of 8 species, 7 of which are Indian the other a native of Europe; one is said to be a native of Travancore. Considerable difference of opinion exists among Botanists as to its proper place in the order. It is certainly very unlike the other Gnaphalioid genera met with on the Hills, but as they are few in number that is no criterion. It associates with the tribe in its caudate anthers and heterogamous capitula.

This is a curious looking plant but has no beauty to recommend it to notice. The beaks of the seed are covered with viscid glands which causes them to adhere to whatever approaches them, hence, as the plant is common in the woods, it is no uncommon occurrence for one who has been walking in such places to find his clothes covered with them on returning from his rambles.

CARPESIUM NEPALENSE (Lessing) hirsuto-villous: leaves elliptico-lanceolate, acuminate, dentate, attenuated into the petiol: capitula subcernuous, campanulate: interior scales of the involucrum subacute.—Petiols and branches villoso-hirsute, leaves pale and more villous beneath: capitula 4 lines broad.—*D. C. l. c.* 6—281.

A common plant in all the woods about Ootacamund, but so far as I am aware neither useful nor ornamental. To the Botanist only it is interesting.

Sub-tribe Senecionæ. *Capitula homogamous or heterogamous; discoid or radiate. Anthers ecaudate, Achænia crowned with a setaceous or pilose pappus the marginal ones sometimes bald. Leaves alternate.*

This, like the last sub-tribe, is an extensive group, more abounding in species but with a fewer genera than it. In that there are 80 genera, in this 25. The difference in the number of species is not so great in proportion. This sub-tribe is only remarkable as including the genus *Senecio* the largest, as regards the number of its species, in the vegetable kingdom, containing, as left by DeCandolle, upwards of 600. In that series the variations in form are numerous and great, and doubtless many genera will yet be constructed out of the genus Senecio, though, as it now stands, the series as a whole is so natural that DeCandolle confesses, that he could not detect characters of sufficient moment to enable him simply to distribute the species into subgenera, and was, consequently, forced to distribute them geographically, grouping those of each geographical division into sections more or less natural. According to these geographical groups it appears that the genus most predominates in Africa, especially towards the Southern extremity, whence 178 species have been obtained, and including Madagascar and Mauritius, 214. The Caucasean district, including Europe and the northern provinces of Africa and Asia, furnish 114; while the whole of America and her Islands only contribute 150—Tropical Asia and all Australia are still more deficient, as they only give 80 to the stock, that is, 45 for Asia and 35 for Australia.

Many of the genera of this sub-tribe are very nearly allied. The principal difference between *Doronicum* and *Senecio* consists in the achænia of the ray of the former being, bald or without pappus, while those of the latter have it. Another genus of this sub-tribe I have separated from *Doronicum* on the ground of both disk and ray flowers being without pappus; generally, however, the genera of this tribe are much more easily distinguished than those of the preceding. Of this sub-tribe but few species are, so far as I am aware, admitted into cultivation and some of them, such as *Senecio vulgaris*, become almost inexterminable weeds.

DORONICUM.

Capitulum radiate heterogamous, ray florets one series ligulate, female or sterile by abortion; disk ones hermaphrodite. Achænia beakless oblong turbinate furrowed, those of the ray bald, of the disk pappose. Pappus setaceous several series.—Herbaceous plants with solitary or several capitula, involucrum one or few series, scales linear: receptacle convex ebracteolate.

This is a small genus of about 20 species nearly half of which are natives of India and five of these found on the Neilgherries. The two figured give a good idea of the habits and general appearance of the plants of this genus which are for the most part easily distinguished, except from *Senecio*, which they generally so greatly resemble that close examination is required for their discrimination.

DORONICUM LESSENGIANUM (Arn.) stem long subterete striated hairy: leaves cordate, amplexicaul, oblong lanceolate, few-nerved, deeply and irregularly inciso-serrated: corymbs few cephalate, terminal: involucrum hemispherical, scales linear subulate, the interior ones oblong lanceolate muricately hispid: ligulæ 8-10, narrow oval, about 9 nerved.—*D. C. l. c.* 6. 322.—*Arnott's pugillus—Madaractis scabra, D. C. l. c.*

Neilgherries, &c. flowering cool season after the rains. This plant is found growing in moist soil near springs and water courses. The flowers are large and rather handsome, but the plant as a whole is common looking. It is however very characteristic of the genus, and to any one wishing to study its characters a suitable subject for the purpose.

DORONICUM CANDOLIANUM (Arn.) suffruticose ramous: branches striated nearly glabrous, few (1-2) cephalous: leaves whitish, hispidly pubescent, pinnatifid; lobes short, oblong acute, occasionally shortly dentate: peduncles minutely bracteolate at the apex: involucrum 1 series, scales lanceolate, whitish, hispid on the back: ligulæ 8-10, narrow, oval, 3-5 nerved.—*D. C. l. c.* 6. 322.—*Arnott's pugillus—Madaractis pinnatifida*—D. C. 6. 439.

Neilgherries, frequent in pastures. A very ramous somewhat diffuse plant, branches terete glabrous naked towards the base, very leafy about the middle, ending in slender somewhat leafy peduncles, bearing two or rarely three, nearly naked pedicelled, capitula: leaves oblong, pinnatifidly narrow, lobed, nearly to the base, revolute on the margin, hispid on both sides, but especially the under: peduncles leafy at the base, pedicels furnished with a few minute scattered bractioles Scales of the involucrum linear, pointed, coarsely hispid on the back: ligulæ about 9, lanceolate, acutish, 4 nerved.

This I consider a more ornamental plant and much fitter for the garden than the other. The small leaves and comparatively large bright yellow flowers entitle it to that distinction, and doubtless were it an exotic brought from Europe it would find favour, but being a native easily procured, it seems to be considered undeserving of notice. Another species of the genus very like this has been long confounded with *Senecio* which I notice for the purpose of showing how much these genera resemble each other in habit and appearance.

SENECIO.

Capitulum homogamous discoid or heterogamous radiate: flowers of the ray female ligulate. Branches of the style of the hermaphrodite flowers truncated, the point only penicellate. Achænia beakless terete or angularly furrowed. Pappus pilose several series, caducous.—Herbs or shrubs, sometimes climbing, with alternate leaves and solitary, corymbose or panicled inflorescence: involucrum one series, sometimes calyculate with accessory squamellæ, often with the points of the scales sphacellate: receptacle naked alveolate. Flowers of the disk always yellow, those of the ray usually so, but sometimes white or purplish.

Through some error on the part of the Lithographer, only one species of this genus has been kept for this work in place of two, a discoid and radiate one as I intended. The error is of less consequence as the two species of *Doronicum* may both be looked upon as representing species of *Senecio* until the achænia of the ray florets are examined and found destitute of pappus which is the essential difference between the two genera. It may perhaps be supposed that the genus might be easily divided into two principal sections according as the capitula have or have not a ray: but on this point DeCandolle observes that, by the adoption of that character the most nearly allied species, or even varieties of the same species, would be disjoined: the same remark is applicable to several other characters that have been supposed suitable for this purpose.

Of the 45 species mentioned above as indigenous in India 7 are found on the Neilgherries or $\frac{1}{7}$th of the whole. This seems a fair proportion considering how large a portion of the genus is extratropical, the bulk of the remaining $\frac{6}{7}$ths being from the Himalayas and upper provinces of India, very few, if any, being found on the plains within the tropics.

SENECIO CORYMBOSUS (Wall—D. C.) stem scandent, terete, araneose (appearing as if covered with cobwebs:) leaves petioled exstipulate, cordately suborbicular, shortly acuminated, subserrated; glabrous above densely tomentose beneath, 5-7 nerved at the base: corymbs axillary and terminal compactly polycephalous: involucrum 8-leaved, bracteolate at the base: ligulæ none: achænia glabrous.—Petiols of the leaves 6-12 lines long, limb about 2 inches in diameter, 10 tubular florets—*D. C. l. c.* 6. 364.

Neilgherries in clumps of jungle climbing to a great extent over the adjoining trees. DeCandolle asks is not this rather a *Cacalia*? This question it appears to me may be safely answered in the affirmative, in as much as it perfectly agrees with both the character of the genus and of the section *Ciseampelopsis*: but it may be asked on the other hand, what is the difference between the two genera and wherein do they differ from *Kleinia*? So far as technical characters enable us to distinguish them, they are identical, those of *Senecio* including all three, which fact, alone, goes far to prove that more than one genus is involved in that mass of species which has set at defiance the efforts of even so acute and perfect a systematist, as the late very celebrated Professor DeCandolle, to reduce them to order.

Tribe 5 Cynareæ. *Style of the hermaphrodite flowers nodosely thickened above, often penicellate at the knot, branches sometimes cohering sometimes free, puberulous exteriorly: stigmatic series not prominent, extending to the points of the branches and there confluent.*

This, like the preceding, is a large and interesting Tribe, embracing most of the true thistles, artichokes, marigolds, burdocks, &c., DeCandolle enumerates as belonging to it 81 genera distributed into 11 Sub-tribes, 13 of which genera furnish Indian representatives. None of these merit much consideration here, except perhaps, *Carthamus tinctorius*, the safflower, the petals of which yield a pink dye, and are prepared and sold as a substitute for saffron. Many of the thistles, indeed the tribe generally, are characterized by intense bitterness, hence many of them have at different times been held in repute as remedial agents, though few seem to have preserved their reputation. A few are used as food, such as the artichoke Cardoon, &c., the seed of others are pressed for their oil; and a few are admitted into the garden as ornamental objects.

Sub-tribe Carduineæ. *Capitula homogamous with numerous equal florets, flowers sometimes dioicous, scales of the involucrum many series free, often ending in a spiney point. Corolla 5 cleft. Filaments usually pilose, papillose or glabrous. Anthers ecaudate or shortly caudate. Achænia glabrous beakless with a terminal areola. Pappus plumose or pilose the bristles often united into a ring at the base but not bound by the prominent margin of the achænium.*

To this sub-tribe the artichoke (Cynara) the multiform thistles (Carduus and Cirsium) which cover the fields and waysides in Europe, and the equally common, but more amusing, Burdocks all belong.

CIRSIUM.

Capitulum homogamous. Flowers hermaphrodite or dioicous: tube of the corolla short, throat oblong. 5 cleft. Anthers ecaudate. Stigmas cohering. Achænia oblong compressed glabrous membranaceous ecostate with a fleshy terminal areola. Herbaceous thistle like plants: involucrum imbricated scales more or less prickly pointed, receptacle frimbriliferous; flowers purple or yellow.

This is a large genus including according to DeCandolle's enumeration, 140 species, three only of which seem to find a place in the Indian Flora, the one here represented occupying the Higher mountain

ranges of the south while the other two are confined to the north. The genus generally is of extra tropical origin, Europe, Asia Minor, and North America being the regions in which the species principally abound.

The Neilgherry species is also met with on the Pulney range and I think on the Shevaroy hills, but of that I am not quite certain.

CIRSIUM ARGYRACANTHUM (D.C.) leaves semi-amplexicaul serrately pinnatifid, ciliato-spinulose, the lobes ending in strong spines; beneath and the stem arachnoideo-villous: capitula paniculato-congested: bracteæ many cleft very prickly: scales of the involucrum terminating in strong spines.—*D. C. c. l. 6. 640.*

Very common on the Neilgherries, about equally so on the Pulney mountains. In moist rich soil it not unfrequently attains the height of 6 or 7 feet. It may be met with at most seasons in flower, but is in perfection in August and September. Flowers pale purple.

Tribe Cichoraceæ. *capitula homogamous flowers all ligulate 5-toothed or 5-nerved. Style cylindrical above and, with its more or less elongated somewhat obtuse branches, equally pubescent: the stigmatic series of glands ending about the middle of the Branches no where confluent. Herbaceous, rarely shrubby, milky plants with alternate leaves.*

This is a very distinct and generally most easily recognised tribe and the plants so constant in these floral characters that, once known, it is scarcely possible afterwards to mistake them. To this tribe belongs the well known Lettuce, Sow Thistle, Hawks-weed, Dandelion, Goats'beard, Succory, &c., most of them to be met with on the hills either wild or in gardens. The number of genera referred by DeCandolle to this tribe is 83, some of which, however, it appears to me, might well be dispensed with. Of these 83 genera 11 have species indigenous to India, but on this point I feel some uncertainty exists, as I cannot help thinking that DeCandolle has, while elaborating this last tribe of his great work, fallen into one or two errors which seem to cast a shade of doubt over some other parts of this division. The plant for example, which I have here called *Microrhynchus*, is described under *Lactuca* by D. C. the former having 5 angled beakless achenia the latter having them compressed and abruptly terminating in a filiform beak. Again, I find *Lactuca Heyneana* agrees much better with the character of *Brachyramphus* than with that of *Lactuca* whence I feel disposed to infer that the whole of D. C.'s section "Mycelis" of *Lactuca* would be better placed under *Brachyramphus* which has a short beaked, muricated, achenium in opposition to the long-beaked smooth one of *Lactuca*.

The properties of this tribe are peculiar, the species are all milky and many of them possess well marked narcotic qualities such as the Lettuce and Succory, though not to such extent as to unfit them for esculents when properly cultivated and used young and succulent. In Europe the chicory is cultivated for the sake of its tap roots which are used as a substitute for coffee and are said certainly to improve that most agreeable beverage when properly torrified and mixed in small quantities. The scorzonera and salsafy are also cultivated for their roots, the latter of which especially, furnish a fine flavoured vegetable. Several others enjoy considerable reputation in domestic medicine in Europe, but being unknown in India need not be noticed here.

The two plants selected to illustrate this tribe are referable to two sub-tribes *Lactucea* and *Hieracieæ*, the distinction between which is mainly derived from the

pappus which is soft delicately filiform and smooth in the former, while it is somewhat rigid and rough in the latter. The other points of distinction are fluctuating and less to be depended upon, being more or less common to both.

Sub-tribe Lactuceæ *Receptacle epaliaceous or rarely paliaceous : pappus hair-like fugaceous, soft silvery white.*

To this section *Lactuca, Sonchus* and several other nearly allied genera, in addition to the one here represented, belong; the species of the genera *Brachyramphus* and *Youngia* have so much the habit of *Sonchus* that they might easily be mistaken but for the achænia which in this tribe, in many instances, furnish excellent easily detected generic characters, as the following examples will show. *Lactuca* achæn. sublenticular furnished with a filiform beak. *Microrhynchus* achæn. oblong, 5-angled beakless. *Brachyramphus* achæn, muricated short beaked neither angled nor ribbed. *Youngia* achæn beakless longitudinally striated. *Sonchus* achæn. beakless longitudinally ribbed often transversely muriculate between the ribs. *Mulgidium* achæn beaked, beak dilated, saucer-like at the apex.

MICRORHYNCUS.

Capitula several flowered. Achænia 4-rarely 5-angled subrostrate at maturity; beak wanting in the ovary. Costæ thick subrugose. Pappus pilose.—Herbaceous perennials, involucrum cylindrical, calyculato-imbricate at the base : receptacle naked : flowers yellow.

To this genus DeCandolle assigns only six species three of which are Indian. The one here figured I have added by removing it from the genus *Lactuca* in which he had, perhaps through oversight, erroneously placed it, as it certainly does not belong to that genus. The other three species are natives of the plains, one is common on the sands near the beach all along the Coromandel Coast.

MICRORHYNCUS GLABRA (R. W. *Lactuca glabra* D. C.) glabrous, stem naked, dichotomously branched about equal or a little longer than the leaves; leaves elongato-linear, somewhat rigid, acute, either entire or dentate : capitula corymbose long pedicelled cylindrical 7-8 flowered : involucrum calyculate with lanceolate squamellæ; squamæ 5-6 linear lanceolate somewhat scariose on the margin, thrice as long as the calyculus; achænia five angled obscurely beaked.—Denticuli of the leaves sometimes nearly wanting often-er retrose : leaves 2-3 inches long, 2-4 lines broad.—*D. C. l. c.* 7.—135 under *Lactuca*.

Neilgherries rather common to be met with in flower at all seasons but most abundant during the rains from July to December. I have ventured to remove this plant from the genus in which D. C. placed it, as the achænium corresponds accurately with the one and not at all with the other. In *Lactuca* the achæ-nium is flattened and abruptly lengthened into a long filiform beak : in this it is pentangular and scarcely beaked.

Sub-tribe Hieracieæ. *Receptacle epaliaceous : pappus filiform, rigid, fragile, becoming dirty white or yellow.*

Two genera only of this sub-tribe, so far as I can discover, have Indian representatives, which seems curi-ous, as the large genus Hieracium, including nearly 200 species, is to a great extent alpine in its habits, and therefore one which, *a priori*, might be expected at least on the Himalayas, if not further south, but does not as yet appear to have been met with on these mountains. The genus *Mulgedium*, on the other hand, furnishes 7 Indian species out of 23, the total number yet known. Six of these are from the Himalayan range and one, that here represented, from the Neilgherries. All the species are alpine plants.

MULGEDIUM.

Capitula many flowered. Achænia glabrous compressed, often nerved on both sides, attenuated up-wards into a beak expanding at the apex into a cup-shaped disk. Pappus one or several series, bristles rigid rough, greyish or white. Erect ramous herbs with pinnatifid leaves and racemose or panicled capitula : involucrum calyculately imbricate, that is, the exterior scales are much shorter and subimbricate, receptate naked, alveolate : flowers blue or purple.

This seems a peculiarly distinct and well marked genus. In habit, it so far agrees with *Sonchus* that the only British species, a very rare Highland plant, has hitherto been referred to that genus. The beaked achænia, however, expanding at the apex into a saucer shaped disk at once distinguishes them. The pappus too is most distinct, in *Sonchus* it is as fine, smooth and flexible as silk, in *Mulgedium* rigid and, as seen under the Microscope, decidedly rough. The purple flowers of the one and the yellow ones of the other are also ready marks of distinction.

MULGEDIUM NEILGHERRENSE (R. W.) stem erect glabrous, somewhat panicled at the apex: cauline leaves runcinately pinnatifid, doubly crenate, dilated and somewhat stem-clasping at the base, terminal lobe subrhomboid, attenuated upwards, mucronate, somewhat hairy on both sides, especially on the veins beneath; floral ones entire lanceolate: pedicels hairy at the apex: capitula ovate, scales of the involucrum imbricate, exterior ones hairy on the back: achenia obovate, compressed, winged, ending in a long beak, pappus setaceous rough. Plant from two to four feet high flowers purple.

Neilgherries not unfrequent in jungly ground and by road sides, flowering during rainy and cool seasons.

It is abundant by the road side leading up to Kelso Cottage and also in the wood behind the house down towards the stream. But I have seen it many other places.

LOBELIACEÆ.

This, so far as regards the number of its genera and species, is a rather extensive order, and interesting as forming the nearest point of approach between the isolated Compositæ and the rest of the vegetable kingdom. In the last tribe of Compositæ, *Cichoraceæ*, the flowers are all ligulate, that is, split along one side, the anthers are coherent and the juice is milky. In *Lobeliaceæ*, the corolla is in like manner split along one side, the anthers cohere and the juice is milky. Here the analogy may be said to cease, leaving still one point of great importance, widely at variance, between the two families. In *Compositæ* the ovary is 1 celled with a single erect ovule; in *Lobeliaceæ* it is 2 or 3 celled with numerous ovules attached all over the surface of a large axillary placenta.

It is the peculiarity of the ovary in connection with their very perfect capitulate flowers which isolates *Compositæ* from the rest of the vegetable world. The relationship between *Lobeliaceæ*, *Campanulaceæ*, and some others, and *Compositæ* is remarked upon by all writers on natural affinities of plants, but to me it appears that, at the narrowest part, the straight by which they are separated, is still a broad one. The *Compositæ* in the vegetable world may be compared to New Holland in the terrestrial, an immense continent surrounded by a wide ocean studded with islands, some, such as *Lobeliace* and *Campanulaceæ*, very near, but still distinctly apart. The one celled ovary with a solitary erect ovule combined with perfect epigenous capitulate flowers, so universal in *Compositæ*, is no where else to be met with. *Dipsaceæ* and *Valerianeæ* make as near an approach to the ovary of *Compositæ* as *Lobeliaceæ* do to the flower, but they are different: in them the ovule is pendulous from the apex of the cell, in *Compositæ* it is erect from the base.

Lobeliaceæ are very generally diffused over the earth's surface, but certainly predominate more in the warmer regions bordering the tropics than within that zone. This habit will account for their much greater predominance on the higher ranges of hills in

this country than on the plains, though they are still to be met with, even down to the beach in the Carnatic. The few however that do seek the plains only come to perfection during the cool season and in wet or even marshy soils, being most frequently met with on the banks of Paddyfields. Two extend far north into the arctic regions, one of which, *L. Dortmanna* as if to shelter itself from the sudden variations of temperature to which the air in these regions is subject, grows under water, except the flower stalk, which rises above during the summer and autumn to flower and ripen its seed. The number of Indian species of the order is not considerable and mostly belong to the genus *Lobelia*, of which I have 7 species appertaining to the Peninsular flora.

The properties of this family are most remarkable. I mentioned above, as one of the points of similarity between the Chicories and Lobelias, that they both abound in milky juice. The properties of these juices are however widly different, that of the Chicories being mildly narcotic and tonic, while that of the Lobelias is excessively acrid and poisonous, destructive even to cattle and horses that eat them, and the mere odour of one of the species is, it is said, so powerfully poisonous, as to cause sickness and vomiting. The economical or medical properties and uses to which our Indian ones may be applied does not seem to have been investigated, as no notice is any where to be found of them. As ornamental objects very many of the family are well worthy the attention of the gardener and I cannot help feeling surprise at their rarity in the flower plots and borders on these Hills.

LOBELIA.

Calyx 5-lobed; tube obconical ovoid or hemispherical. Corolla longitudinally split along the upper side, bilabiate; tube cylindrical or funnel shaped straight; the superior lip often smaller and erect, the inferior usually spreading 3-lobed or rarely 3-toothed. Anthers the two lower ones, or sometimes all, bearded at the apex. Ovary inferior or half superior and sometimes even almost superior.—Herbs or rarely shrubs with alternate leaves usually racemosely spiked flowers, with axillary pedicels, the corolla being blue, or white, or violet, or red and yellow mixed.

This genus, as left by Linnæus, embracing the whole of the order, so far as known to him, only included 27 species. There are now 27 genera, while the single genus *Lobelia* includes upwards of 200 published species and the family of *Lobeliaceæ* about 400. This family affords an interesting example of the rapid extension of our knowledge of the vegetable kingdom in recent times. In 1768 when Linnæus published his 12th edition, the last edited by himself, of the Systema Natur 27 species were known, 80 years after in 1848, the number had increased to 400, an average increase throughout that long period of nearly 5 per annum. Out of that vast number the Indian list scarcely amounts to 20 species, showing how little this family partakes of a tropical character. Five of these 20 are indigenous on the Neilgherries and one of them, *Lobelia excelsa*, perhaps the largest of the genus. There are several yet to be added; my own collection contains 10 or 11 species, some of which are still unpublished. There is a small cespitose species much cultivated in pots, by amateurs, under the strange name of "Neilgherry grass" I suspect the *Lobelia succulenta* of Blume, a Java plant, but of which I cannot make myself certain, as I have not a specimen to examine. It is procumbent, roots at the joints, and in a short time quite covers the pot with a rich green carpet, variegated with small blue flowers forming a great contrast to the tall ungainly *L. excelsa* of the Hills.

1170. LOBELIA TRIGONA. (Roxb.) glabrous, branches diffuse, erect, or ascending and like the stems trigonous: leaves subsessile, ovato-subcordate, repandly dentate, teeth mucronulate: pedicels slender, longer than the leaves, bibracteolate at the base: tube of the calyx oboonical, lobes linear, acuminate, about the length of the tube: corolla small, glabrous, longer than the calyx: anthers enclosed, all bearded at the apex: capsule oboroid.—*D. C. Prod.* 7. 360.

In moist pastures on the borders of rice fields frequent, also abundant in swampy grounds on the Neilgherries.

This is usually a low diffuse plant growing amongst grass. Stems weak and succulent, the leaves succulent when growing, but thin and membranous when dry. Flowers pale blue. The habit of the plant is well represented in the drawing.

1173-4. LOBELIA EXCELSA. (Lesch.) stem very large, herbaceous, erect: leaves lanceolate, shortly petioled, narrow at the base, acuminate, denticulate, puberulous above, tomentose beneath: racemes foliaceous pubescent, many flowered: bracts long acuminate, glandulose-denticulate, twice the length of the pedicels: lobes of the calyx erect, linear-lanceolate, denticulate, thrice the length of the hemispherical tube; equalling the length of the tube of the pubescent corolla.—*D. C. Prod.* 7—381.

Very common on the Neilgherries. A tall, ungainly looking plant, flowering during the rains, from May to September but to be met with in flower at all seasons. The stems are annual but the roots seem perennial. The stems are currently met with from 6 to 8 feet high, but may often be seen from 10 to 12 feet, flowers pale yellowish, tinged with lilac, pubescent, ovary more than half superior.

Many persons seem to have an idea that this is a species of Tobacco, "Hill Tobacco," and have asked by what process of cultivation it becomes the tobacco of commerce. I presume that ere this time the readers of these pages do not require to be told that, no process of cultivation could ever so alter this plant as to convert it into tobacco though, for any thing I know to the contrary, it may greatly resemble that plant in its properties, but that is improbable.

CAMPANULACEÆ.

It is still a subject of discussion among Botanists whether Bell-flowers and Lobelias should be viewed as separate families or sections of one larger group. The question is too abstruse for this book, but it may be remarked in passing, that if properties be allowed to have any weight in deciding the question, it may soon be set at rest as nothing can be more widely distinct. The juice of both is milky, but in this, having a large admixture of mucilaginous matter, it is of the mildest and least irritating quality, while in the other, as already stated, it is in many instances highly acrid, corrosive and poisonous. This, added to certain Botanical distinctions, such as the irregular flowers and united anthers of the one and the regular bell-shaped corollas and free anthers of the other, certainly make out a strong case in favour of their separation.

In regard to its extent, it is nearly on a par with the other, the number of genera, in this being 26 with about 450 species. Like *Lobeliaceæ* it is a pre-eminently extra-tropical family, the Indian members bearing about the same proportion in both, and in either case nearly the whole inhabiting the more elevated alpine regions. It seems curious that they should be found so sparingly on the Himalayas, considering their frequency on the European and Caucasean ranges of Mountains. According to Alphonse DeCandolle "the chain of the Alps, Italy, Greece, Caucasus, and the Altai range are their native country;" the same high authority informs us, the Cape of Good Hope is another centre of habitation, containing not fewer that 63 species; a number considerably increased since he wrote. The properties of this family are of inferior note, much more associating with those of *Cichoraceæ* than *Lobeliaceæ*, the roots of some of them being esculents and formerly esteemed very nourishing and, on account of their milky juices, especially appropriate to lactescent women! As garden ornaments, many species are held in high esteem and very generally

admitted into flower gardens, though I question if any species of the whole family is so generally admired as the delicate and modest Hare-bill of the English pastures, whose unassuming beauty has been so often sung by rural parts. I have never seen a growing specimen of that plant on the Hills, though I feel sure that its introduction and naturalization there is desired by many, as adding another link to the many associations with our native country which these favoured regions already supply. There are no want of Campanulas or Bell-flowers in the Hill gardens, but the true Harebell or Witch's thimbles, of the Scotch peasantry, is not among them.

This family presents one of those beautiful instances of design on the part of the Great Architect, so often passed unheaded by the careless observer, or if noticed, casually denominated "a curious provision of nature" but which cannot be too often or too forcibly dwelt upon by those who would teach the attributes of the Deity, by an exposition of the wisdom and design which meet us at every step in studying his works of creation. As it is simply and clearly explained by Dr. Lindley in the 14 letter of his Lady's Botany I shall extract the passage entire.

"From the base of the corolla, and consequently from the summit of the ovary, spring five stamens, whose filaments are broad, firm and fringed, curving inwards at the base and bending over the top of the ovary, as if to guard it from injury; their points touch the style and keep the anthers parallel and in contact with it till they shirvel up and fall back which happens immediately after the flower unfolds. The style is a taper, stiff column, about the length of the corolla and longer than the stamens. It is covered all over up to the tips of the stigma with stiff hairs which nature has provided to sweep the pollen out of the cell of the anthers as the style passes through them in lengthening. If it were not for this simple but effectual contrivance, as the anthers burst as soon as ever the corolla opens, their pollen would drop out of the nodding flowers and be lost before the stigma was expanded and ready to receive the fertilizing influence; (the hairs of the style catch the pollen and keep it till insects, wind, or accident brush it down upon the inverted stigmas."

Two genera of this order are found on the hills, the one *Wahlenbergia* bearing some resemblance to the Hare-bell of Europe, but very different, the other *Campanula*, of which there are several species, but none of them common.

The order has been divided into two tribes or suborders, namely:

Wahlenbergieæ, with the capsule opening on the vertex, within the circle of the limb of the calyx, and Campanuleæ, with the capsule opening laterally.

The Neilgherry Flora presents examples of both these tribes.

WAHLENBERGIA.

Calyx 3-5 cleft, Corolla 3-4-5 lobed above or more rarely cleft down to the middle, funnel shaped, subcampanulate, or tubular. Stamens 5-3 free, filaments dilated at the base. Style hairy, especially on the upper part. Stigmas 3-5, or 2 at length spreading, usually linear short. Capsule 5-3-2 celled, valves septifer-

ous dehiscent at the apex; the cells when 5 opposite the lobes of the calyx. Seeds numerous, minute. Herbaceous annuals, sometimes perennials, or even shrubby, most abundant in the Southern hemisphere, especially about the Cape of Good Hope. Leaves alternate, congested toward the base. Peduncles terminal and axillary, often elongated, forked, Pedicels long slender terminal or leaf opposed; flowers drooping; capsules erect.

This genus, as it now stands in DeCandolle's Prodromus, includes 100 species, only 9 of which are natives of India. Three or probably 4 of these are found in the Peninsula; the remainder are from the Himalayas

1175. WAHLENBERGIA AGERATIS. (Alph. D. C.) stem erect, ramous from the base, pilose below: lower leaves approximated, narrow linear, nearly entire, undulated on the margin; pedunoles usually dichotomous with very short bracts: tube of the calyx glabrous obovoid, shorter than the erect linear narrow lobes: corolla funnel shaped about a twice the length of the lobes of the calyx: capsule obovoid.—*D. C. Prod* 7. *p.* 434.

Neilgherries frequent, in flower at nearly all seasons, flowers pale blue. I am not quite sure that this is identical with the Nepaul plant or rather, whether I ought not to have viewed this as *W. Indica* rather than the following which is as much less common plant on the hills and is perhaps a new species. If however this is W. Indica, then it seems probable the two species ought to be united, as this corresponds well with the character in all points, except in the station.

1176. WAHLENBERGIA INDICA? (Al. D. C.) stem ramous below and like the leaves pilose: leaves linear entire acuminate: peduncles 1 flowered glabrous: calyx glabrous, tube ovoid, lobes narrow acute: corolla tubular about a half longer than the calyx, capsule obconical.—*D. C. Prod.* 7. 434.

Neilgherries in moist pasture land. In the operation of transfer this figure has been represented too hairy, in the original it was finely pilose. On this account it would probably have been better to have suppressed the figure, but it is hoped this explanation will suffice to correct the error of the existence of which I was not aware until the whole impression had been printed off.

Since the above was printed I have examined several additional specimens and now feel satisfied that different specimens vary in their hairiness and that this is not materially in excess.

CAMPANULA.

Calyx 5-cleft. Corolla slightly 5-lobed or 5-cleft usually campanulate. Stamens 5 free, filaments broad membranaceous at the base. Style during flowering covered, except at the base, with collecting hairs. Stigmas 3 or 5 filiform. Capsule 3-5 celled, valves 3-5 dehiscing laterally. Seed ovate flattened or ovoid. Herbs usually perennial, sometimes low and pressed to the ground sometimes two or three feet high, erect, many flowered, with the cauline leaves often differing from the radical ones. All natives of the northern hemisphere.

This is a very large genus including, with the more recent additions, above 200 species and all from the Northern hemisphere. Alph. D. C. in his monograph of the order divided it into two sections the one having and the other wanting reflexed appendages in the clifts of the calyx. These primary sections, are further divided according to the number of cells of the capsule the position of the dehiscing pores, &c., all the Indian species belong to the second section "sinus calycis non obtecti, capsula 3 locularis" and the two first of the following species to the sub-section "capsula nutans, pedicellata, valvis adbasin sitis dehiscens." This mode of dihescence by means of valves situated on the sides or near the base of the capsule is peculiar to this genus and readily distinguishes it from all the others of the order. It is thus familiarly explained by Dr. Lindley in the work already quoted, Lady's Botany. "But how are the dust-like seeds to find their way out of this lidless box or penetrate its tough sides? Considering what happens in so many other plants we should naturally expect that it would take place by a separation of the edges of the three carpels into valves, near their points; but upon looking at the top of the ovary between the sepals, we find that part still tougher than its sides and without the slightest appearance of opening. It is by rending the thinnest part of the sides of the fruit in the fork of the three principal ribs that these valves are produced and that nature provides for the escape of the seeds. The rending takes place by the final drying of the sides of the fruit when every part becomes stretched so tight, that any weak portion must of necessity give way. As the stretching takes place with uniformity, and as the skin at the forks is always more tender than any other part, the opening of the valves will consequently occur with the same invariable certainty as the formation of the seeds." The valves thus described are seen in the magnified figures of the capsules in the three species figured, while by the position in which they are placed, another fact is illustrated, namely that in two of them the capsule droops or hangs down at the period of maturity while in the third it remains erect, circumstances which have not been overlooked in grouping the species into sections for facilitating their determination, the two first belonging to the section "Capsula nutans" the third to the one "capsula erecta."

CAMPANULA ALPHONSII. (Wall.) decumbent one-flowered: stem pubescent, cauline leaves sessile, sub-lanceolate acute, denticulate, pilose above, incanous beneath: calyx pubescent, divisions ovate serrated or sometimes lobed, about half the length of the campanulate puberulous corolla. *D. C. Prod.* 473. (very slightly altered.)

Neilgherries forming dense tufts in clefts of rocks.

The specimen represented is very different from the one described by D. C. though unquestionably the same species; I have therefore in the character ventured to make one or two slight alterations, but I suspect scarcely enough to give a correct idea of the species.

CAMPANULA RAMULOSA. (Wall.) stem erect, pilose ramous: leaves lanceolate sessile, crenato-dentate, veins prominent beneath: pedicels axillary and terminal: calyx pilose, lobes broad acute sub-dentate about half the length of the cylindrical villous corolla; capsule turbinate drooping. *D. C. Prod.* 7. 473.

Neilgherries, in woods and about hedges in shady places. The original specimens of this species were from Nepaul, but so far as character enables me to decide, the Southern plant does not differ.

CAMPANULA FULGENS. (Wall.) stem erect, about a foot high, hairy: leaves lanceolate acuminated at both ends, short petioled, serrated: flowers subsessile, axillary solitary or three together, approximated towards the apex: lobes of the calyx subulate erect entire, about the length of the infundibuliform glabrous corolla.—*D. C. Prod.* 7. *p.* 477.

Neilgherries, on grassy slopes and pastures, frequent. I have another form, apparently, of this plant with the flowers congested into a capitulum. Flowering season June and July during the rains, but not confined to that season as it may be found in flower at nearly all seasons. The Neilgherry plant seems to differ from the Bengal one in the calyx, being considerably shorter than the corolla, which leads to the suspicion of its being a distinct species though, from its agreeing so well with the character in other respects, I cannot venture on giving it a new name.

VACCINIACEÆ.—BILBERRY-TRIBE.

Botanists are divided in opinion whether this family ought to be kept distinct or should form a suborder of the Heath-tribe, *Ericaceæ*. The question is not easily answered being one on which much may be said on both sides without leading to conviction on either, such being the case I shall not attempt to discuss it here beyond merely stating that those who insist on keeping them distinct, do so on the ground of the ovary being in this inferior, and the fruit generally a berry, while in *Ericaceæ* the ovary is superior, that is, lodged within the tube of the corolla, and the fruit capsular, opening by valves to give exit to their innumerable dust-like seed. In all other respects they may be said to associate on the most amicable terms, as may be seen from the examples here given.

In regard to this controversy it may perhaps be remarked, en passant, that it would be fortunate if all our orders rested on as satisfactory characters, even though it may well be doubted whether, in the present instance, they are calculated to produce conviction, especially after adverting to the characters of *Lobelia* in which it is said the ovary is inferior or half superior (see *L. exeda*) or quite superior; or still better to those of *Rosaceæ* in which both structures are abundantly obvious in its different suborders: or perhaps better than either to *Myrsiniaceæ*, where in the section *Maesæ*, the flowers are epigynous while the rest of the order has them hypogynous.

The plants composing this order are generally, if not always, trees or shrubs of great beauty, usually with alternate leaves and bell shaped or long tubular flowers in which pink is the predominating colour, though in some they are the purest white, forming lovely clusters on the ends of the branches. None of the Indian ones with which I am acquainted possess this character they, for the most part, having elongated racemes: but some have their flowers solitary from the axils of the leaves. The stamens with few exceptions are included within the tube of the flower and are very curiously formed bodies, especially the anthers. The proper anther, or pollen case, is two celled and opens by pores: these for the most part are surmounted by two long tubes open at the apex and furnished on the back with two bristles. These bristles are not however so constantly present as the horns or tubes. These appendages are so general, that they have procured for the group of orders in which they occur the characteristic name of *Bicornes*. They are found in all the Neilgherry

species except Rhododendron, in which they are wanting. In its geographical distribution the family is very decidedly extratropical the northern parts of Europe and especially north America being truly their native country. Many however are also found in south America beyond the tropics inhabiting the elevated valleys of the Andes, as in India they do those of the Himalayas, Neilgherries, Pulney mountains, Newera Ellia of Ceylon, &c. In upper Assam, in the Khasyah mountains they also greatly abound. There the late Mr. Griffith collected between 20 and 30 species.

The fruit of nearly all possess an agreeable acid, whence many are in daily use as esculents in the northern counties of Europe. The well known Cranberry so famous for tarts belongs to this family and the fruit of the species here figured *V. Leschenaultii*, when fully ripe, makes a very excellent substitute, with the exception of a dash of bitter with which the acid is combined, requiring an additional quantity of sugar to render it equally palatable. With this addition I can safely recommend these berries as a tart fruit, as I have eat many tarts made of them, giving them the preference to some of the preserved fruits of Europe.

Beyond that I am not aware of any use to which either of the hill species has been applied. The following generic character and remarks on the genus *Vaccinium* I republish from my Icones, vol. 4 part 1st, in which I have published figures of 14 species most of them new.

VACCINIUM.

Calyx adherent, limb 4-5 lobed. Corolla tubular 4-5 cleft. Stamens 8-10 epigynous, anthers adnate, 2 celled, often furnished with 2 bristles on the back, the cells ending in a tube open at the apex. Ovary 4-5 celled, placentæ ascending, usually, bearing the ovules on the margin. Berry 4-5 celled, often spuriously 10 celled through the adherence of the walls to the thickened placentæ. Seed several in each cell, testa coriaceous or somewhat bony: albumen fleshy: embryo orthotropus, radicle next the hilum. Trees, shrubs, &c.

According to this character it is of no moment whether the lobes of the calyx are large or small, whether the corolla is long or short, thick or thin: the anthers may or may not be bristled, but are always expected to have the cells more or less prolonged into tubes, and to have the number of cells of the ovary equal to those of the lobes of the calyx and corolla, with, more or less distinctly, free ascending placentæ and a plurality of ovules. Such is the genus *Vaccinium* as understood by me when naming the following and several other still unpublished species in my herbarium.

Dunal, in his monograph of the Order *Vaccinia*, retains *Agapetes* and *Thibaudia*, Endlicher, Miesner, and Lindley unite them. Kunth is followed by Miesner in expressing a doubt as to whether *Ceratostema* is distinct from *Thibaudia*, and Hooker states that he "cannot understand what are the essential distinguishing marks between them." Among the following are species which have been referred by different Botanists to *Ceratostema*, *Agapetes*, *Thibaudia*, *Gaylussacia* and *Vaccinium*. To determine among so many genera it became indispensable to examine the characters of all with much care. After the closest scrutiny and careful dissection of the flowers of all the Indian species in my collection side by side with several acknowledged *Vaccinia* from both America and Europe, I found it utterly impossible, from the characters given, to make out more than one genus among the Asiatic ones, the structure being the same in all. By Roxburgh these would perhaps have been all referred to *Ceratostema*: Wallich refers them to *Thibaudia*, while Don and Dunal form the genus *Agapetes* for their reception. Had long tubular flowers been a constant feature, I might on that account, aided by geographical distribution, have followed these authors, and, assuming that as its essential character, kept up their genus. This however is far from being the case, and is therefore, as a generic character, useless. And on turning to Dunal's character of *Vaccinium*, I find the corolla described as "campanulata, urceolata vel cylindrica."

In all the Indian ones it is either urceolate or cylindrical. He describes the stamens as "limbo calycis inserta," which is the case in all the Indian ones I have examined, and the fruit "Bacca calyce vestita globosa 4 aut 5 locularis loculis polyspermis, rarissime 10 locularis loculis monospermis" which, except the last clause, is equally applicable to the fruit of all I have had an opportunity of examining. The ovary unfortunately, is not referred to in the character of either genus. The concluding clause of the character may perhaps account for Professor Lindley's referring one of the species to *Gaylussacia* which, while that clause remains as part of the character of *Vaccinium*, seems scarcely a distinct genus, the fruit having 10 cells with 1 seed in each being its essentially distinguishing mark. In all other points Dunal's characters of the 2 genera, are nearly word for word the same, and the abortion of all the ovules but 2 in each of the 5 cells converts *Vaccinium* into *Galussacia* and, unless care is bestowed in the examination, even that is not necessary, as a transverse section of a nearly mature fruit almost always presents the appearance of 10 cells with one seed in each, and I feel nearly certain that an examination of the *ovary* will shew that but few of Dunal's 29 species have it 10 celled with a single ovule in each. *G. dependens*, an authentic specimen of which was most obligingly communicated to me by Mr. Gardner of Ceylon, has a 4 celled ovary with numerous ovules and is in fact a species of *Vaccinium* with very short anther tubes.

Whether *Ceratostema* can be kept distinct I am unable to say, but judging from the really essential points of the character, apart from the numerous non-essential ones introduced by Dunal, I think not. *Thibaudia* has one good distinguishing mark in the union of the filaments between themselves and their attachment to the base of the corolla. But if that is to be taken as the essential character of the genus, then both *Macleanea* and *Anthopterus* should be associated as subgenera, the collateral marks derived from the calyx and corolla being scarcely of generic value in a family where these organs are so variable.

Influenced by such considerations, I have without hesitation referred all the Indian species to *Vaccinium* with the sub-generic appellation *Agapetes* to mark their Asiatic origin.

VACCINIUM (A) LESCHENAULTII (R. W. *V. arboreum* Lesch. not Michx. *Agapetis arborea* Dun in D. C. Prod. *Andromeda symplocifolia* Wall. L. No. 1522,) arboreous older branches glabrous, greyish white, ramuli pubescenti-villous: leaves shortly petioled, ovato-elliptic, serrated, acute, paler beneath, hairy on the costa: racemes axillary and terminal, about the length of the leaves.

Neilgherries, frequent, flowering March and April, but usually to be met with in different situations in flower and fruit at all seasons. The berries which are about the size of red currants are agreeably acid and make excellent tarts, much resembling in taste those made with the cranberryus. *Oxycoc palustris* or *O. macrocarpus*.

1189. VACCINIUM (A) NEILGHERRENSE (R. W.) shrubby, glabrous, except the pubescent young shoots and leaves: leaves lanceolate, acute at the base, acuminate at the point, racemes longer than the leaves, axillary, usually confined to the extremities of the branches: flowers whitish or rose coloured, short pedicelled, usually furnished with a large foliaceous bractea: corolla ovate, slightly pubescent: filaments hairy anthers bristled: tubes dilated towards the apex.

On the low banks of streams Neilgherries: abundant along the banks of the Pycarrah river for a mile or two above and below the Bungalow. Flowering during the dry season, from February till April. It is nearly allied by its technical characters to the former, but is evidently quite distinct. The large foliaceous bracts supplies the best distinguishing mark, but both, in habit and locality it differs. Flowers usually white and smaller than those of the preceding, smaller, even than those of the specimen selected for representation.

ERICACEÆ.—HEATH-TRIBE.

An extremely beautiful family of plants and most deservedly reputed among the greatest favourites of the lovers of fine flowers, a commendation more especially applicable to the genus *Erica* (the true Heath) from which the family derives its name. It is unnecessary to give any general description of the family here, as that would be nearly to repeat what has been already said under *Vaccinieæ*, in every thing except the position of the ovary, which, in this, is superior or lodged within the tube of the corolla, while in that, the corolla is seated on the top of the ovary. The fruit also differs; in this it is for the most part dry and capsular, either opening at maturity by the edges of the carpels, or along the divisions of the seed vessel, into as many valves as there are cells in the ovary, or more frequently, along the middle of the cells, leaving the partition adhering to the middle of the valve; while in Vaccinium it is an indehiscent berry with fewer seed and these lodged in pulpy cells.

The genus *Gaultheria* is an intermediate form, or sort of half way house between them; the ovary is at first superior and the mature seed are the small dust-like forms met with in the rest of the family, but the calyx grows with the growth of the seed vessel and by the time it has attained maturity has covered it with a thick pulpy coat giving it quite a berry like appearance which, until dissected, might easily be mistaken for a true berry and mislead the observer as to the family to which, it belongs. The same may, to some extent, be said of the strawberry tree, *Arbutus*, though from a different cause, the thickening namely of the seedvessel itself, changing the fruit from a capsule into a sort of berry or Nucnlanium which, unless carefully looked to, might easily pass for a true one, which, however, differs in being usually inferior or enclosed within the tube of a fleshy calyx.

The family very naturally divides itself into four tribes or suborders easily defined and differing so far in habit as to be generally readily recognized, namely ARBUTEÆ with indehiscent berried fruit and deciduous corolla. ANDROMEDEÆ fruit capsular opening along the middle of the cells, (loculicidal) corolla deciduous, buds always scaly: ERICEÆ fruit capsular loculicidal, or rarely septicidal, corolla withering on the stalk (not deciduous) buds without scales. RHODOREÆ fruit capsular splitting along the partitions (septicidal) corolla deciduous often deeply cleft, flower buds usually scaly. The two Neilgherry species belong to the second and last of these tribes *Gaultheria* being Andromedious and *Rhododendron* of course Rhodoreous. These two tribes with *Arbuteæ* are principally confined to the northern hemisphere and abound in Europe and North America, while Southern Africa is truly the native country of the true *Ericeæ*: a small portion only of the vast genus *Erica* being indiginous to countries north of the line.

In regard to properties, this family may almost be passed over in silence, not but that some of its members possess them and in considerable energy, but because they are not such as can, in this country at least, be rendered available to the wants of mankind, except as objects of great beauty, pleasing to the senses and furnishing fine subjects for the flower garden and shrubbery.

GAULTHERIA.

Calyx 5 lobed, afterwards enlarging becoming more or less baccate and enclosing the capsule. Corolla ovate, mouth often contracted 5 toothed. Stamens 10 included, filaments often villous: anthers 4 awned, namely, each cell biaristate rarely muticous. Ovary 5 celled free, embraced at the base by 10 hypogynous scales, placentæ ascending; style filiform; stigma obtuse, more or less lobed at the apex. Capsule globose, depressed, 5 celled, 5 furrowed, 5 valved, dehiscing loculicidally, the valves bearing the partitions. Seed numerous minute, testa reticulate. Evergreen shrubs or small trees natives of America and India. Leaves alternate, dentate or entire. Pedicels axillary one flowered or racemose, furnished at the apex with two bracticles. Corolla white, rose coloured, or scarlet.

In this character there is no allusion to the occasional partial abortion of the stamens shown in figures 4 and 5 of the accompanying plate.

This fine genus is one of considerable extent about 50 species being already described. Its essential character is the fleshy calyx and consequent spuriously baccate fruit. This can only with certainty be made out in specimens with fruit far advanced towards maturity which may, perhaps, account for Sir W. Horker referring our species to *Andromeda* and D. C. doubtfully to *Leucothe* in neither of which that character exists, both indeed, in the estimation of Endlesher, forming but one genus, the grounds of separation not being, in his opinion, of more than sectional value.

GAULTHERIA LESCHENAULTII (D. C. *G. ovalifolia* Wall. List No. 1523. *Andromeda Katagherensis*, Hook Icon. 246. *Leucothæ Katagherensis*. D. C. Prod. 7, p. 606 *Andromeda flexuosa !* Moon) glabrous, ramuli subtrigonous : leaves petioled ovate or obovate, terminating in a gland, crenulate, punctuate beneath : racemes axiliary or lateral pubescent, a little shorter than the leaves, erect : bracts concave acute glabrous, one under the pedicel, two near the flower. D. C. Prod. 7—593.

Neilgherries, abundant and to be met with in flower at all seasons. It is a considerable sized ramous shrub with every thick coriacious leaves and pure white flowers. Berries blue.

I have adopted DeCandolle's specific name, in preference to Wallich's having a specific character attached : on the same grounds Hooker's specific name hold priority had he correctly recognized the genus. It seems curious that D. C. should have overlooked the indenity of Hooker's plant with his own, as the figure is most characteristic, especially when aided, as it is, by a good character and description. The oldest name is undoubtedly Moon's, but he also referred it to a wrong genius.

RHODODENDRON.

Calyx 5 parted. Corolla funnel shaped rarely campanulate or rotate sometimes regular sometimes more or less irregular always 5 lobed. Stamens 10 (rarely 6-9 by abortion), not adnate to the corolla, situated before and between the lobes, usually declinate, exserted. Anthers opening by two terminal pores. Capsules 5-celled and 5-valved, or 10-celled and 10-valved dehiscing along the partetions. Seed, attached to an angled columnar axis, compressed, dust-like, subulate.—Shrubs or trees : leaves evergreen petioled entire : flowers disposed in termenal corymbs : the flower buds scaly : corolla conspicuous, purple white or yellow.

This character which is copied from DeCandolles Prodromus, will now require to be somewhat modified to admit two new species I have recently published in my Icones. In one the calyx and corolla are 8 lobed with 16 stamens and a 16 celled ovary. Here the relation is preserved only differing in number. In the other the calyx is entire with a free somewhat undulated or crenate limb, the corolla 5 lobed, stamens 15 and the ovary 10 celled, but the forms of the anthers, style, and stigma ; the structure and position of the placentæ and ovules all agree with those of the other species.

Whether the altered relations in regard the number of parts of the flower, added to a racemose tendency in the inflorescence entitles this last species to become the type of a new genus, my limited acquaintance with the genus Rhododendron does not enable me to determine, though such seems not improbable if my analysis prove correct, of which I feel some doubt, as the specimen had suffered from the attacks of insects. The placentation of this genus, if not indeed of the order, is peculiar. The ovuliferous margins of the carpellary leaf do not, as in most others with axillary placentæ, coalesce and form a central fleshy placenta, but are inflexed remaining free, each margin bearing a row of ovules. The draughtsman not observing that peculiarity of structure has conveyed a most erronious idea of the structure of the ovary in his transverse section figure 5.

The genus is a large one including, according to DeCandolles list, 44 species, and some have since been added ; these are all natives of the northern hemisphere inhabiting the colder regions of Europe, America and Asia, several are found on the Himalayas and on the mountains of Java. I have one from Malacca and the accompanying is common to the Neilgherries and Nuoera Ellia in Ceylon. Many of the species are very handsome and prized as ornaments in the shrubbery.

Little seems known regarding their properties, two or three are employed medicinally in Europe on account of the tonic and somewhat narcotic qualities they are known to possess but their use seems limited to domestic medicine.

RHODODENDRON ARBOREUM. (Smith.) arboreous, leaves lanceolate, glabrous, scaly beneath : flowers compact corymbose : ovary pubescenti-tomentose 8-10 celled. *D. C. Prod.* 7—720.

Neilgherries, very frequent. Flowering in great perfection in March and April. Leaves rusty coloured beneath, flowers deep crimson. The tree itself, apparently, from usually growing in exposed situations, has a gnarled stunted appearance ; its compact capitula of flowers are always terminal.

PRIMULACEÆ—Primrose-tribe.

This tribe to which the Primrose, Oxlip, Cowslip, Auricula Loosestrife and Pimpernel belong, furnishes but few species to the hill flora, three only, so far as I am aware, having yet been found indigenous on them and these not those endeared to us by early associations through the delight experienced in our juvenile days on beholding, in early spring, sunny banks bedecked with tufts of fragrant yellow flowers when all around was still held in the cold deadly grasp of winter. Two of ours belong to the Loosestrife family (Lysimachia) and the other is a Pimpernel (Anagallis) or "poor man's weather glass" as it is sometimes called in allusion to its only opening its flowers during fair weather and closing them on the approach of rain. In Europe these genera are found on the plains flowering about Midsummer, while the Cowslips and Primroses are either natives of the cold mountain tops or flower in early spring. To this circumstance perhaps may be attributed the fact of the summer forms only extending to our southern mountains, while the spring ones frequent the more northern and colder Himalayas.

The flowers of this tribe are remarkable on account of the position of their stamens with regard to the lobes of the corolla. It may here be mentioned that a monopetalous corolla is assumed to consist of as many petals combined into one as there are lobes, hence that the corolla of the primrose which has five lobes is composed of 5 petals. It may further be observed that in perfectly regular flowers, having double the number of stamens that there are petals, that the first or outer row are alternate with the petals and the second or inner opposite to them. In *Primulaceæ* the stamens are always opposite to the lobes of the corolla not placed between them. This is important as indicating a great irregularity in the flower which is attributed to the total suppression of the outer row of stamens. This remarkable peculiarity is only known to occur in three families of exogenous plants *Primulaceæ*, *Myrsineaceæ* and *Plumbagineæ*. The two first are so closely associated as only to be distinguished by habit, the former being always herbaceous with capsular fruit the latter shrubby or arboreous with drupaceous fruit. These characters can scarcely be admitted to be of ordinal value, hence, by rights, the two orders should be united and reduced to the rank of suborders. But as no inconvenience in practice results from their separation all systematic writers seem disposed to leave well alone and let them remain as they are.

Another peculiarity of this family is found in the ovary and capsule but is not well brought out in the accompanying dissections, which is, that it consists of a single cell with a free central placenta covered on all sides with ovules which lie flat on its surface. The cause of this is, according to Dr. Lindley, ascertained by dissecting the ovary when very young, long before the expansion of the flower, when it is found to be 5 celled but the slender partitions break and disappear before the flower opens leaving the otherwise very inexplicable appearance designated a "free central placenta." The same it is said, is found exist in *Myrsineaceæ* but I have not succeeded in verifying the observation in either case.

This family is greatly prized by florists on account of the extreme beauty and fragrance of their flowers, and as being the earliest harbingers of spring, a distinction

well merited by their bright rich colouring and modest look and early blooming. Some of them possess properties of considerable activity but which it is unnecessary to notice here.

LYSIMACHIA.

Calyx 5 parted Corolla 5 parted subrotate or campanulate longer than the calyx. Stamens 5 inserted into the base of the corolla: filaments sometimes united at the base; sometimes as many sterile filaments, as fertile ones. Anthers oblong. Capsule globose, 5-10 valved, dehiscing at the apex, many seeded. Herbs, usually perennial: leaves alternate opposite or verticelled entire: flowers axillary racemose, spicate or panicled.

This genus, of which there are now nearly 50 species known, is principally confined to the more temperate regions of the northern hemisphere. Only 10 species were however known to Linnæus, showing that the European proportion of species is not so great as might be supposed. It is in truth a widely distributed genus in proportion to the number of its species Europe, Asia Minor, India, Ceylon, China, Japan, New Holland, Cape of Good Hope and North and South America all claim representatives. Like the Neilgherries, Ceylon claims two species both I think distinct from ours though one is certainly very near our yellow flowered *L. deltoidea*. They are not generally I believe much thought of as garden ornaments, though some of them are not devoid of beauty, as the one here given testifies, but, so far as I am acquainted with the genus, this is a favourable example. It is somewhat remarkable that, though always found in its wild state growing in wet marshy ground, it bears transfer to the garden and seems to thrive to the full as well as there in dry soil as in its native marshes.

LYSIMACHIA (EPHEMEDRUM) LESCHENAULTII (Dubyin D. C. Prod. V. 8.) erect, ramous, leaves opposite or ternate lanceolate, sinuate (?) entire, acuminate, glabrous, short petioled: flowers racemose crowded: bractioles linear subulate, acuminated, much shorter than the pedicels: calyx much shorter than the companulate corolla, divisions linear lanceolate acuminate, lobes of the corolla obovate obtuse, entire: stamens equal exserted: style filiform. D. C. Prod.

Neilgherries, frequent in low moist or even marshy soils and generally to be met with in flower. Plant herbaceous perennial from two to three feet in height. Flowers on first opening reddish-white, streaked with darker lines afterwards acquiring a rather deep lylac tinge.

ANAGALLIS.

Calyx 5 parted. Corolla rotate deciduous deeply 5 parted, lobes broad obtuse. Stamens 5 inserted into the bottom of the corolla, free or, rarely, more or less united at the base, filaments bearded. Anthers attached by the back near the base, more or less nodding, introrse. Capsule globose circumcise membranaceous, seeds numerous angular immersed in a central placenta. Herbaceous or rarely suffrutiscent plants: leaves opposite or alternate: pedunoles axillary solitary.

Of this pretty and interesting genus 11 species only are known and it may well be doubted whether they all deserve being retained as species. They are, if we may so say, a wandering race and almost always to be found in cornfields where European grain is cultivated. It is I suspect through that medium we are indebted for the very pretty one here figured which is sufficiently frequent about Kotegherry where Wheat and Barley are pretty extensively cultivated. Such being the habit of the family it seems more than probable that the same species has, under the influence of changing climate, run into varieties of sufficient permanence to lead to their being considered so many distinct species. Linnæus described 5 species, the accompanying being one of them, which therefore must have found its way from Europe, most likely with grain-seed. But, however it may have come, it is now thoroughly at home now on the Neilgherries.

ANAGALLIS LATIFOLIA (LINN) roots herbaceous: decumbent, ramous: branches elongated, 4 sided, slightly winged: leaves opposite or ternate broad ovate, semiamplexicaul, subacute, spreading: peduncles longer than the leaves: calyx a little shorter than the corolla, lobes narrow linear-lanceolate acuminate: corolla nearly twice as long as the stamens, lobes obovate obtuse, finely serrulate: filaments hairy: capsule about the length of the calyx. *D. C. Prod.*

Neilgherries, in corn fields and other cultivated lands: flowers blue.

Duby asks is this a genuine species? The question is not easily answered but so far as my slender acquaintance with *A. arvensis* enables me to judge, I confess I feel disposed to answer in the negative, though, on slightly comparing my Neilgherry specimens with European ones of *A. arvensis* there does appear some difference. This more nearly approaches the variety *A. cærulea*, if indeed it is not that very plant, of which however I have not a good specimen to compare. The Indian plant is much more luxuriant than the European.

MYRSINEACEÆ.

As already stated under Primulaceæ this order is but a section of that, in so far as orders rest on the structure of the organs of fructification; *Myrsineaceæ* having, like *Primulaceæ*, an inferior calyx and corolla, the stamens attached to the middle of the lobes, not alternate with them, and a free central Placenta covered with ovules. In habit they differ widely, *Primulaceæ* being generally herbaceous with capsular fruit, *Myrsineaceæ* shrubby or arboreous with drupaceous fruit. In this family, as in several others, we meet with two of those departures from the usual structure which are ever crossing the path of the systematist, to the material disturbance and derangement of his arrangements, as if to keep constantly reminding him, that nature will not submit to the trammels of human systems but will have her own way in forming family ties and relationships between families apparently widely separated. The character of this order is to have the ovary free with numerous ovules and the mature fruit, through the abortion of all the ovules but one, with a single full grown seed. In *Mæsa* the ovary is inferior, that is, enclosed within the tube of the calyx and the berry contains many seed: and in *Embelia* and *Samara* the corolla is polypetalous, or in other words the petals of which it is composed have departed from the character of the family by remaining uncombined.

The inferior fruit of *Mæsa* places that genus in more or less intimate connexion with a whole group of orders having epigynous flowers while it is still retained among its more immediate relations by the position of its stamens opposite the lobes of the corolla and by its free central placenta. The polypetalous flowers of *Embelia* and *Samara* again bring them into connection with another set of families having polypetalous flowers, but here again the stronger ties of stamen bearing petals and free central placenta overcome the weaker ones of non-cohering petals and retain it among the Primulaceous group.

Looking back to the remarks made under *Vacciniaceæ* which Dr. Lindley has removed from the Epigynous to the Hypogynous group we can scarcely help feeling surprised that this section is passed unnoticed by him though open to the same objections.

This family which now includes about 320 species was all but unknown to Linnæus, two species only being described by him namely *Samara læta* and *Myrsine Africana*. Of the credit of having detected and well defined the former of these genera he had very nearly been deprived, though nothing can be more precise than his character. The circumstance of course does not originate in any wish to deprive him of the merit

which is his due, but arose from the circumstance of his having loosely quoted a figure which he thought belonged to the species which he was describing from specimens in hand, but which in truth belonged to a totally different plant, as has since been discovered, and because he quoted the plant figured, under a wrong name, it has been assumed that it was his plant (though totally different) and his genus altogether suppressed and a new one set up in its place.

Dr. Arnott when recently in London and having an opportunity of examining Linnæus' original specimen, was enabled to trace the history of the error through its whole course and restore the Linnæan *Samara* to its place in the Botanical system, but to the exclusion of Alph. D. C.'s *Choripetalum* which is in fact identical with the older genus.

This family is widely but very unequally distributed, apparently, preferring those countries enjoying a rather high but equable temperature. They most abound in the Islands of the Indian Archipelago, next to which ranks Bengal, Burmah, and the Tenasserim Coast. The Indian Peninsula and Ceylon are placed low in the scale, whether owing to these possessing fewer in proportion, or to their being less known, I am unable to say, but I do know that I have nearly twice as many in my own collection as D. C. assigned to both countries in 1833, when his very excellent paper was read to the Linnæan Society.

MÆSA.

Calyx bibractiolate, 5-lobed, æstivation quincuncial, 2 exterior, 3 interior. Corolla 5-cleft subcampanulate, lobes obtuse: in æstivation one lobe exterior another interior, the three middle ones imbricately convolute on the margins, all obtuse inflexed on the margin. Stamens 5, free, incluse, filaments filiform. Anthus ovoid sperical, cordate, shorter than the filaments. Pollen (dry) ellipsoid. Ovary adnate to the calyx sometimes half superior in the flower, the placenta at the base within the tube of the calyx. Style short. Stigma capitate often obsolately 3-4-5-lobed: sometimes the lobes 5, distinct, opposite the lobes of the calyx. Berry covered by the calyx, ovoid. Ovules numerous immersed in depressions of the central placenta. Seeds numerous, turbinate, angled, flattened above. Embryo cylindrical, the commissure of the cotyledons towards the hilum.—Shrubs or trees of Asia or Africa usually hermaphrodite: leaves alternate sometimes pellucido-punctuate: racemes axillary or terminal simple or compound at the base: flowers small white: bracts at the base of the pedicels persistent minute narrower than the bractiols: bractiols addressed to the flower. The essential character of this genus is simply; Corolla superior 5-lobed. Stamens 5 opposite the lobes of the corolla. Ovary 1-celled with numerous ovules attached to a free central placenta. Fruit baccate many seeded.

The genus was published in 1775, under the name here given and again in 1776, under that of *Bæobotris* and, for a long time, both were retained, until at length it was ascertained they were the same, when of course the older of the two took precedence. This will explain the cause of its appearing in Roxburgh's Flora Indica under the latter, he not being aware of the other belonging to the same plants. It now includes about 30 species, 24 of which are natives of India, the Eastern Islands and China, the rest are of African origin. The admitted species seem to me to run so much into each other, that I greatly doubt whether a more extended and intimate acquaintance will not tend to reduce the number, some of them appearing to be varieties taken up from imperfect specimens, of other species. Indeed I can scarcely help thinking that varieties of the species here given form the basis of several of those defined by Alph. D. C. but of that I cannot feel certain without authentic specimens to compare with it.

Myrsa Indica (Alph. D. C.) : leaves ovato-elliptic acuminate, coarsely dentate, membranaceous, subrevolute on the margin : racemes axillary and terminal, simple or ramous at the base, glabrous, twice the length of the petiole : bracts lanceolate acuminate, shorter than the pedicel, bracteoles ovate acute : lobes of the calyx ovate subciliate : corolla 5 cleft, 3 times the size of the calyx, lobes obovate subciliate spreading : ovary semisuperior stigma capitate sublobate.—*D. C. Prod.* 8. 90.

Alpine jungles in various parts of the peninsula, on the Eastern slopes of the Neilgherries rather frequent. Between this and *M. Perrottetiana* I can discover no satisfactory difference. This may indeed be that plant as it grew on the Neilgherries, but I have numerous specimens from other localities which seem all, with but slight variations, to correspond with it. I have therefore adopted the older name though I suspect the newer might have been safely given. The genus indeed seems a very difficult one, different specimens varying in appearance but scarcely affording specific marks of distinction.

EMBELIA.

Calyx 5-parted or deeply cleft. Petals 5-reflexed quincuncial in æstivation, 2 exterior and 3 interior. Stamens 5, filaments united with the base of the opposite petal. Anthers ovoid emarginate at the base and sometimes at the apex, 2-celled, dehiscing longitudinally. Pollen (dry) ovoid furrowed. Ovary ovoid often most minute. Style short : stigma incluse, capitate, sublobate. Ovula 4-1, often abortive, inserted on a central placenta, often most minute. Drupa globose. Seed solitary not filling the cavity of the pericarp. Scandent trees or shrubs : leaves alternate usually entire, petiols often marginate or denticulate. Flowers racemosely panicled or racemose or rarely subcapetate : Flowers small, occasionally, by abortion of the pollen or ovules, sub-dioicous : petals approximated at the base spreading or reflexed.

Of this genus there are 26 species, more or less perfectly known, natives of India, the Eastern Islands and the Madagascar group. It may be said to have been unknown to Linnæus, for, although he saw and partly described one species, he never characterized and named it as the type of a genus.

That species is found in Ceylon and also in the Tenasserim Provinces, one very like it is abundant about Coonoor, so like indeed that for a long time I considered the two identical, which however is not the case. The habit of the accompanying species is so unlike that of all the others I have seen, that it seems not impossible more intimate acquaintance may lead to its removal from the genus, though that does not seem probable. In the mean time it may be viewed as a very distinct and well marked species quite different from all the other Indian ones.

Embelia Gardneriana (R. W.) : young branches and petioles ferrugineo-hirsute : leaves ovate, rounded at the base, crenulato-serrated, coriaceous, glabrous, except the sparingly hairy costa, reticulately veined : pedunoles axillary short, ferrugineo tomentose : racemes capitulate : pedicels about as long as the peduncles, glabrous : calyx much shorter than the glabrous corolla : petals obovate obtuse longer than the stamens, sprinkled with purplish coloured spots.

Sispara on the western slopes of the Neilgherries in clumps of jungle, rare. Flowering February and March.

A diffuse shrub, remarkable in the genus for the venation of the leaves which, when dry, form quite a net work of white lines. In habit it associates with *Samara* but its quinary flowers seems to keep it distinct. I have dedicated this very distinct species to Mr. Gardner of Ceylon, who accompanied me when it was found and gathered the first flowering specimens. Thro' an oversight of the draftsman the branches are represented glabrous in place of clothed with short hairs.

SAMARA Linn. *(Choripetalum Alph. D.C.)*

Calyx 4-cleft lobes acute. Petals 4-spreading or reflexed afterwards separately deciduous ; æstivation valvate (in *S. aurantiacum*, imbricate, according to Wallich, in *S. undulatum*) stamens 4-adnate to the base of the petals. Anthers 2-celled lanceolate ovoid cordate at the base. Pollen (in *S. aurantiacum*) very minute, spherical marked with lines on the surface. Ovary ovoid conical often depressed and abortive. Style short, stigma capitate subinfundibuliform rugous or subbilobate. Placenta globose, ovules few immersed over the upper part of the placenta. Seed indusiate, globose concave at the base. Scandent shrubs, branches glabrous diffuse : leaves glabrous punctate petioled : racemes axillary slender simple. Habit of Embelia.

The above with one or two slight alterations is taken, from D. C.'s Prodromus, being his character of

Choripetalum. The following character of *Samara* I take from Linnæus' genera Plantarum which will, I think, bear me out in adopting Dr. Arnott's opinion as to the identity of the two genera.

Calyx minute 4-parted acute persistent. Corolla 4-petals ovate sessile with a longitudinal furrow at the base. Stamens 4, filaments long subulate immersed in the furrow. Anthers subcordate. Pistil. Germen ovate half the length of the corolla, ending in a cylindrical style. Stigma funnel shaped. Pericarp a round drupe. Seed solitary. His essential character is—Calyx 4-parted, Corolla 4-petaled, Stamens immersed in the base of the petals, Stigma infundibuliform. Both these embrace all the essentials of a precise Botanical generic character as perfectly as all those embodied in Alph. DeCandolle's more extended one, and prove clearly enough that he truly had a genuine species before him, when he constructed his character of the genus and not Memecylon as D. C.'s remark under *Myrsine lata* would lead us to suppose.

Our plant must therefore revert to the older generic name since it perfectly agrees with the Linnæan character so far as it goes; and, perhaps, along with it, two species described by Roxburgh under the name of *Samara*, one from the Circars the other from the Moluccas, which D. C. does not seem to have taken up, as I cannot find any notice of them in any of his Monographs, of the order.

The genus is a small one, but will probably be found more extensive than is now surmised, as there is room to suspect that one, at least, and probably more, may be found referred to the genus *Myrsine* which it, in some respects, resembles, being principally distinguished by its quaternary not quinary flowers, the flowers in Myrsine being occasionally so deeply parted as to become almost polypetalous. I think I have observed in this, as well as in *Embelia*, that when they flower at irregular seasons nearly all the flowers are imperfect and sterile, while at other seasons, nearly every flower (judging from the quantities of fruit produced) seems fertile. The polygamous tendency therefore adverted to by DeCandolle in both characters is, perhaps, not owing to some plants being uniformly sterile and others fertile, as the same plants seem to me to be both at different times. My opportunities however, for close observation have not been such as to enable me to assure myself of the existence of this curious anomaly, still less to assure myself of the seasons at which they respectively occur. The same thing, it strikes me, also occurs in both the species of *Ilex* found at Ootacamund. The specimen of *Samara*, here represented, seems either taken from a male plant or to have been gathered during the sterile season, which I think is the cold one immediately after the rains, as all the flowers seem deficient in the ovary, those that flower in spring are I think fertile. They flower at both seasons.

SAMARA AURANTIACA (R. W. *Choripetalum aurantiacum* Alph. D. C.) leaves ovate-lanceolate, subacute at both ends, entire, coriaceous, long petioled: racemes much shorter than the leaves, longer than the petiols, bracts acuminate as long as the pedicels: petals linear lanceolate reflexed: filaments longer than the petals, much longer than the anthers.—*D. C. Prod.*

Neilgherries also Malabar, flowering during the dry season. When in full flower the branches are quite covered with the numerous racemes of bright orange coloured flowers. The leaves vary considerably in size, being from three to six inches long by from 1½ to 2 broad, usually ending in a blunt acumen.

MYRSINE.

Flowers polygamo-dioicous quaternary or quinary. Calyx 4-5-cleft. Corolla 4-5-parted. Stamens free, filaments inserted into the base of the corolla. Anthers 2-celled erect lanceolate glandulose-acute, dehiscing longitudinally. Pollen (dry) sperical. Ovary globose, style cylindrical, stigma capitate papillose, irregularly lobed or fimbriated. Placenta sperical depressed at the apex. Ovules 4 or 5 peltate, amphitropous. Drupe pea-shaped, putamen crustaceous. Seed solitary.—Shrubs or trees, with alternate coriaceous leaves; axillary fascicled flowers; imbricating caducous bracts: flowers often 4 or 5 androus, in the same plant, small: male ones larger: stigma in the female flowers sometimes large, coloured.

This is a large genus of which Alph. D. C. enumerates 75, more or less perfectly known, species. Sixty one of these, sufficiently well described to be considered known, are about equally divided between the old and new worlds, 31 belonging to the latter. They are mostly of tropical origin but in India, so far as I am aware, seek the cooler climates of Alpine regions.

A. DeCandolle seems to have experianced considerable difficulty in finding natural sections into which to group allied species and suggests that, perhaps, the estivation of the calyx and corolla might be taken for that purpose. So far as I can make out, I should doubt their yielding good characters, the amount of variation being so small that I confess I should feel almost disposed to put all mine down as valvate the accompanying among the rest, though its estivation is certainly imbricate, the very edges only of the petals being over lapping. The genus, so far at least as the Indian species are concerned, is very unassuming in its aspect and is therefore very little known except to Botanists.

MYRSINE CAPITELLATA. (Wall.) leaves, elliptico-obovate entire, coriaceous, glabrous, narrowing into the petiol: fascicles numerous, 5-8 flowered bractiate: bracts imbricated, ovate: flowers short pedicelled; teeth of the calyx ciliate; lobes of the corolla lanceolate acute, two or three times longer than the calyx, exceeding the stamens.—*D. C. Prod.* 8—95.

Leaves 4-6 inches long, acute or obtuse, everywhere punctuate, those of the margin longer—flowers polygamous, the fascicles, owing to the imbricating bracts, resembling small cones. Nepaul.

β grandiflora, leaves smaller, lobes of the corolla 4 times longer than the teeth of calyx, Neilgherries, *D. C. l. c.*

Ootacamund, frequent in clumps of jungle, flowering February and March, when the naked branches, below the leaves, are quite covered with its numerous compact capitula of flowers, an appearance which the artist has not been successful in representing. The branch in fruit conveys a better idea of its appearance in that stage.

ARDISIA.

Calyx 5 parted. Corolla 5 parted or 5 cleft, the lobes spreading or reflexed; estivation of both tending towards the left. Stamens 5 inserted into the base of the tube of the corolla: filaments free, usually short: anthers free erect, emarginate or bifid at the base; often triangular, acuminate: cells dehiscing longitudinally. Ovary rounded 1 celled: style filiform subulate at the apex; placenta central spherical: ovules numerous, 6-12, peltate. Drupe globose, externally fleshy, usually glabrous, coriaceous, hard within, seed one. Trees shrubs or undershrubs: leaves alternate, rarely opposite or ternate, punctuate, entire or serrated: flowers panicled or rarely racemose, peduncles terminal or axillary, pedicels usually umbellulate at the points of the peduncles: corolla white or rose coloured, often punctuate, drupes usually purple.

This is an extensive genus, 91 sufficiently known species being enumerated in D. C.'s Prodromus, exclusive of 20 regarding which some uncertainty prevails. It is generally tropical in its habits and is nearly equally divided between India and tropical America the predominance, in the number of species, leaning towards Asia. The accompanying is the only species I have met with on the Hills, and it does not ascend above 5000 or 5,500 feet, showing how little this family is disposed to encounter the cold of the more elevated Alpine regions, while at the same time they are peculiarly attached to subalpine stations. I have several from the Hills about Courtallum and Ceylon in both of which stations they enjoy an equable and moist climate. Many of them are exceedingly handsome shrubs, the one here figured not the least favoured in that respect. It prefers shady jungles in moist soil near streams.

ARDISIA HUMILIS. (Vahl.) leaves obovate lanceolate obtuse, subentire, coriaceous contracted at the base into the petiol: racemes umbelliform axillary and terminal reflexed, shorter than the leaves: lobes of the calyx orbiculate, subciliate: lobes of the corolla lanceolate, subacute, twice the length of the calyx.—*D. C. Prod.* 8—129.

Eastern slopes of the Neilgherries, subalpine jungles, in moist soil near the banks of streams, flowering March and April. This is a beautiful and somewhat variable plant but is not likely to be confounded with any other species. Its showy rose or rather light purplish flowers shining black fruit and large bright shining leaves makes it a most conspicuous shrub. In favourable situations it becomes a small tree. That from which the specimens represented were taken was nearly 20 feet high. It is a widely distributed and conspicuous plant and has received several names as *A. Solanacia, littoralis, Duna, olaracea, umbellata, &c.*

I am uncertain to which of D. C.'s varieties this belongs but think his last.

ILICINEÆ—HOLLY-TRIBE.

This small order was formerly considered a tribe of Celastrineæ, and as such it occupies a place in DeCandolle's Prodromus. Brogniart, an eminent French Botanist, pro-

posed in 1826 to remove it and constitute the Holly-tribe a distinct order. Those who recollect the Holly-tree of Europe with its bright prickly leaves will scarcely suppose that the two here represented are species of the same genus, but yet, when the flowers and fruit are compared, and it is from them generic characters are principally derived, no difference is found except in the number of carpels, and that is not constant as may be seen by comparing figures 5 and 7 of the accompanying plate where one has 5 the other 6 carpels. In the European Holly, 4 is the usual number, so that the Indian forms (Prinos) can at best be only viewed as a section of the same genus, a view which is further confirmed by the fact, that the original *Prinos*, is described as having six lobed corollas, six stamens and six carpels; here we have them 5 lobed and 5 stamens, though it is not improbable six may occasionally be found. But the mere circumstance of such irregularity existing shows that characters taken from such variable organs are not to be depended upon, and, in the instance of this genus their value is still further reduced by a Nepaul species which has only two carpels.

The species are widely distributed but predominate in the warmer regions, the West Indies, South America, Cape of Good Hope, some in North America and several in India and Ceylon. Three are found on the Neilgherries and three or four on the more elevated regions of Ceylon. In Wallich's list of Indian plants six species are named exclusive of the Neilgherry ones. In Europe only one species is indigenous, the common Holly.

Several species are famed for the possession of active properties, the bark of the common Holly has been successfully employed as a substitute for Peruvian bark in the cure of intermittent fever and its berries are purgative and emetic, but perhaps the most celebrated is the Ilix Paraguayenses which yields the far famed Paraguay tea or *Mate*, of which a very full account has been published by Sir W. J. Hooker, in the London Botanical Journal. It is there said, " it is certainly aperient and diuretic, but its other qualities are more problematical, though, to individuals who accustom themselves to it, the habit becomes second nature and to break it off, or even to diminish the customary quantity, seems almost impossible. Like opium it certainly seems to rouse the torpid and calm the restless, but, as in the case of that noxious drug, the immoderate use of it is apt to occasion diseases similar to those consequent on the practice of drinking strong liquors."

I have quoted this passage with reference to one of the Neilgherry species *I. denticulata* which nearly accords with the American one in its Botanical characters, and may possibly, like it, when analyzed, be found to contain *Theine*, the Alkaloid of Tea and Coffee.

ILEX—Holly-tree.

Calyx inferior 4-6 lobed permanent. Corolla wheel shaped in 4-6 deep elliptical spreading concave lobes or as many petals slightly cohering by their broad bases, much larger than the calyx. Filaments awl-shaped shorter than the corolla, and alternate with its lobes. Anthers small two lobed. Ovary roundish. Styles none. Stimas 4-6-obtuse permanent. Berry globular 4-6-celled. Seeds solitary in each cell, oblong pointed angular at the inside rounded externally.—Trees or shrubs with alternate petioled, polished, sometimes

prickly coriaceous leaves: axillary many flowered peduncles: flowers bisexual or imperfect and polygamous by the abortion of one of the sexes.

With reference to this last peculiarity it may be mentioned that the specimen figured of *I. Wightiana* has perfect bisexual flowers that of *I. Gardneriana* has them imperfect, the male organization only being developed. The latter was gathered in February and at the same season I examined many flowers of the other similarly imperfect on trees having fruit on them, whence I infer that the season at which the flower expands exerts some influence on their fertility.

ILEX (P.) WIGHTIANA. (Wall.): glabrous, leaves ovato-elliptic or elliptic acuminate entire, coriaceous: umbels numerous axillary or from the scars of fallen leaves, pedicels about the length of the peduncles, often longer: flowers often polygamous by abortion, corolla 5-6-cleft, berry 5-6-seeded.

Neilgherries—frequent: to be met with in flower at nearly all seasons, but in greatest perfection in all February and March.

A large umbrageous tree everywhere glabrous, leaves from an inch and half to two inches long, coriaceous, shining above paler and dull beneath, usually ending in a short abrupt acumen. Flowers very numerous, small, white; at certain seasons nearly all males, at others generally bisexual. Berries about the size of a pea, red when ripe.—I measured one tree 18 feet in circumference at about 6 feet from the ground.

ILEX GARDNERIANA. (R. W.): suberborescous glabrous: leaves ovate lanceolate or subcordate, ending in a tapering acumen: umbels axillary or aggregated on the naked branches: pedicels often shorter than the peduncles, sparingly hairy: calyx and corolla 5 lobed, the former sprinkled with short hairs.

In clumps of jungle near Sispara on the Western slopes of the Neilgherries, flowering in profusion in February.

A small tree or large shrub, and at the time we gathered the specimens figured, one of great beauty. It was not then in fruit, indeed most of the flowers seem males. It seems very nearly allied to the preceding but differs in habit, in its much larger, more membranous, and long acuminate leaves, and also in larger and more conspicuous flowers. At first I felt disposed to consider this a variety of I. Wightiana, viewing the larger size of the leaves and flowers as depending on the plants, being younger and more luxuriant, an error which Mr. Gardner first pointed out, I therefore dedicate the species to him.

SAPOTACEÆ.

This order is so tropical in its habits, that I am not aware of more than three species being found on the Hills, out of about 230 which it contains. On the plains they are more numerous, but so far as regards the number of species they are far from numerous in India, probably about 30 composing the whole. In the Madagascar Islands including the Mauritius and Bourbon, they seem to exceed that number, several are from the Eastern Islands, a few from China, New Holland and the Cape, but the bulk of the order are natives of America and the West India Islands. In its affinities this order seems nearly related to both the preceding, but is still amply distinct, so much so, that Lindley places all three in different alliances, esteeming *Sapotaceæ* more nearly allied to Rhamneous plants, *Ilicineæ* to Gentianeous ones and *Myrsineæ* to a third set vary different from both, consisting of *Plumbago*, *Plantago* and *Primula*. The affinities which led to the adoption of the two first of these seem to me overstrained, while those which connect *Sapotaceæ* and *Ilicineæ*, which appear stronger than the other, are altogether broken down. Between *Myrsineaceæ Primulaceæ* and *Plumbagineæ* the connecting links are strong, much more so, it appears to me, those between *Myrsineaceæ* and *Sapotaceæ*: while, as I understand them, the relationship between *Sapotaceæ Ilicineæ* and *Ebinaceæ* is most close and intimate: structure habit and geographical distribution all combining to give strength to the alliance. *Styraceæ* (the next order) which most Botanists look upon as so closely united with *Ebinaceæ* that Endlicher has even arranged them under that order as "allied *Ebenaceæ*," Lindley has placed next *Sapotaceæ* in his Rhamnal Alliance. In this distribution it seems to me he

has not been quite so fortunate as in the case of *Myrsineaceæ* except in so far as *Sapotaceæ* is concerned ; the relationship being apparently not less intimate between *Sapotaceæ* and *Styracaceæ* than between *Sapotaceæ* and *Ebinaceæ* while the relationship existing between *Styracaceæ* and the *Rhamnal* alliance through *Celastraceæ*, seems barely made out in some points and is altogether wanting in others of equal or even greater importance, whence there is reason to infer, Dr. Lindley's arrangement will not be adopted.

This order furnishes some very useful products the Gutta Percha the most valuable. The Sappodilla plum, a delicious fruit much resembling in taste a rich Jargonelle pear, belongs to this family. The Indian Eloopee's (*Bassia*) are variously employed, the stems, flowers and seed being all applied to some useful purpose. The stem as timber, the flowers as food and the basis whence a spirit is obtained by distillation, and the oil both for burning and as a substitute for ghee. The fruit of two species of *Mimusops* are eat by the natives, but not much admired and that of the *Sapota* here figured is pickled by the natives on the Hills. It much resembles in taste and appearance a small crab and is not likely to find many admirers unless it can be improved by cultivation and become like that of the *Sapota Acras* or Sappodilla plumb.

SAPOTA—SAPPODILLA.

Sepals 5-6 obtuse imbricated. Corolla tubulose-campanulate 5-6 lobed : with as many epepetalous scales (sterile stamens) inserted on the tube alternate with its lobes. Stamens 5-6 opposite the lobes of the corolla below the scales : anthers extrose 2-celled dehiscing longitudinally. Ovary ovoid hairy 5-12 celled. Style cylindrical glabrous. Stigma undivided obtuse. Ovules solitary in the cells ascending anatropus. Berry by abortion few or one seeded, seed nutlike compressed elongated ; the inner angle sulcated. Testa shining. Albumen fleshy. Embryo central, radical inferior, cotyledons foliacious.—Milky trees, branches sometimes spinous : leaves alternate entire coriaceous : flowers axillary : berry apple-like, often large, fleshy, eatable when ripe.

This genus contains 12 species 3 of them Indian : three from Brazil two Australian one Mauritius one Philippine Islands one Guinea and one uncertain but all tropical except perhaps the last.

1218. SAPOTA ELENGOIDES, (Al. D. C.) : branches often spinous, ramuli ferrugenio-tomentose : leaves acute at both ends, glabrescent, entire : flowers axillary, few : pedicels the length of the petiol and like the calyx clothed with rusty coloured pubescence : lobes of the calyx ovate, acute, the 3 exterior ones broader ; corolla about twice the length of the calyx, 5 cleft, lobes erect, ovate, acute ; tube, externally, pilose : anthers apiculate, sterile stamens oblong subulate, the length of the stamens, the back and the margins pilose.—*D. C. Prod.* 8—178.

Neilgherries, in almost every wood about Ootacamund, in flower and fruit at all seasons.

A large tree with rough cracked bark, hence much covered with both parasitic and epiphytic plants of all kinds. The flowers except from their number are not conspicuous, and have no beauty. The fruit is about the size of a crab, and not unlike one agreeing moreover in the sour austere taste of that fruit. It is made into pikcles, and the natives cook and eat it in their curries. The spines are axillary from 1 to 2 inches long : the leaves from 1½ to 2 inches scarcely coriaceous : flowers solitary, or 3 4 together, white : anthers, extrorse : ovary hairy, 6 celled, with a single ascending ovule in each, three or four of which usually abort before the fruit attains maturity.

ISONANDRA.

Calyx 4 parted, the two exterior lobes large. Corolla 4 cleft or 4 parted, lobes in æstivation, twisted to the left no scales. Stamens 8 in a single series all equal cohering at the base with the tube of the corolla. Anthers hastate, erect, 2 celled, extrorse, dehiscing longitudinally ; 4 larger opposite the lobes of the corolla. Ovary free, hisped, 4 celled (five, by a mistake of the artist, in the plate) ovules 4 ascending. Style exserted, glabrous Berry fleshy, one seeded by abortion, seed obovoid erect, testa cartilagenous, albumen copious, cotyledous foli-

aceous longer than the radicle. Trees with alternate entire leaves: flowers axillary, aggregated; petals short or wanting. The stamens of this genus being all perfect, and these opposite the petals more developed than those alternate, show clearly that the scales found in their place in other genera, are indeed abortive stamens. The dissections of this plate are not good, the relative sizes of parts not being properly preserved—the filaments are much too long—and the ovary is represented with five, in place of four cells, an error which escaped me when sending the original drawing to the Lithographer, and which I could not prevent at the time of making, as I was absent when the drawing was made.

This is a small genus all the published species, except one, being peninsular plants. Six have been published, and my collection contains two more, one of them from Ceylon. Two species are found on the Neilgherries, one in the woods between Pycarrah and Nedlwottum, and about the Avalanche, the other nearly half way down the Sispurah pass. In regard to properties, nothing, so far as I am aware, is yet known, beyond the single fact that it has recently been ascertained that the famous Gutta Percha is the produce of a species of this genus.

1219. ISONANDRA PERROTTETIANA (*A. D. C.*) leaves elliptic narrowing at both ends, apex obtuse, base acute, glabrous above, slightly pilose beneath: flowers sessile, lobes of the calyx ovate rotundate, silky; corolla deeply 6 cleft.—*D. C. Prod.* 8 –168.

Neilgherries, in jungles, about Sisparah and the Avalanche, flowering February and March.

Arboreous, the ramuli clothed with rusty coloured silky hairs, leaves from 3 to 4 inches long, shining above, dull or silky beneath, flowers small, sessile, forming dense capitate on the leafless branches, calyx of a brownish rusty colour, corolla white, style exserted, ovary 5 celled, with 1 ovule in each, fruit usually 1 seeded obovate. The analysis of this, as regards the calyx, is not quite correct.

STYRACACEÆ—STORAX-TRIBE.

This is a small order as regards genera, but not so as regards species, there being upwards of 120 distributed among six genera. It is rare that Botanists have to complain of there being too few genera for the species of an order, but on the present occasion, it would appear such is the case, the genus Symplocos, apparently including two if not three good genera. Linnæus was acquainted with five species, which he made the types of 4 genera. Three of these are still retained, the fourth, *Hopea*, which, if kept up, would have received the four accompanying species, and many other Indian ones, was long ago reduced and united with *Symplocos*, from which, judging from a species I possess (See Icones, No. 1237) properly referable to it, they seem generically distinct, it having long tubular flowers and many series of stamens all united at the base into a tube, in place of, as in ours, having the Corolla cleft nearly to the base, and the filaments free throughout. That obstacle to their union, is partly removed by grouping all the species in which it occurs into distinct sections of the combined genus, a proceeding which would have been unnecessary, had both the original Linnæan genera been allowed to remain. In that case, as already remarked, the whole section would have been referable to his genus *Hopea*, which would then have had the convenience of structural distinction as well as geographical distribution in its favour: all the Indian species, with the solitary exception above noted, belonging to it, while the true Linnæan *Symploci* appertain to the American Flora. A solitary *Hopea*, claims America as its native country, in like manner as a solitary *Symplocos* claims India for its place of abode.

The relationship between this order and *Ebenaceæ* is certainly very close, so close indeed that I doubt, whether technical characters can be found to separate them, though apparently distinct in nature. The character on which most reliance is placed, is the relative position of the ovary and flower, Hypogynous in *Ebenaceæ*, Perigynous in *Styracaceæ*, but I think Mr. Bentham has shown, most satisfactorily, that in this instance these cannot carry much weight.

The genus *Symplocos*, § *Hopea*, abounds in the Alpine and Subalpine forests of India; nearly 40 species being already known, but I do not recollect having once met with a species on the plains. One *Symplocos*, § *Cyponema*, I found on the Pulney mountains, and also in Ceylon, but have not yet found it on the Neilgherries. It is an interesting species in connection with the Geography of that section of the genus which is otherwise exclusively extra Asiatic.

Of the genus Styrax, which gives the name to the order and includes nearly 50 species, four or five only are natives of India. As regards economical relations little need here be said, only one of the Indian ones so far as I am aware, being applied to any useful purposes. Some of the species of Symplocos yield a yellow dye, and it is probable most of the Indian ones would yield that colour, as the leaves of nearly all turn yellow in drying. Storax and Benzoin, two fragrant gum resins are obtained from two species of *Styrax* one a native of Syria, the other of the Malay Islands. While some of the Brazilian species, yield a fragrant secretion of a similar nature which is used in Roman Catholic Churches as frankincense.

The Indian species above referred to is *Symplocos laurina*, (now *S. spicata*), a native of the Neilgherries, the bark of which is celebrated in Bengal, as a mordant for red dyes, but has not, so far as I am aware, been similarly employed in the Carnatic, except perhaps as an imported article of commerce.

SYMPLOCOS.

Calyx 5-cleft, often ciliate. Corolla of 5-8-10-petals, in one or two series scarcely united at the base, but cohering by means of the adnate stamens. Stamens inserted into the extreme base of the corolla 15, or numerous sometimes penta—or poly-adelphous, oftener monadelphous, the tube of the stamens, more or less extensively united to the corolla. Filaments filiform, or ligulate contracted at the apex. Anthers ovoid, globose 2 celled, ovary inferior or half inferior, 2-4-5-celled, Ovules 2-4 pendulous from the apex of the cells. Style filiform, stigma capitellate, simple or 3 sided. Berry crowned by the calyx, often, by abortion, reduced to one or two cells. Seed solitary in each cell. Albumen copious. Embryo axile. Cotyledous very short. Trees or Shrubs: leaves alternate serrated or crenulate, usually turning yellow when dry: racemes axillary, many flowered, bracteate: flowers, sessile or pedicelled white or red.

This genus as it comes from the hands of Professor A. De Candolle, is a large one, including 60 species.—His very extended character makes it a complex and difficult one, especially as regards the character of the flower assigned to it, viz. a "Corolla scarcely cohering at the base," while the characters of his two first sections commence, "Corolla basi tubulosa" and these comprise 27, out of his 57 sufficiently known species. If the genus as it now stands, is, as he believes, truly a natural one, he might, I think, easily have avoided so great an anomaly as that in his generic character. The section *Hopea*, the only one we have to deal with here, has the "Corolla 5-parted spreading, stamina cohering at the very bottom, sometimes pentadelphous; filaments slender, ovary 3-celled, stigma capitate trigonous." This character brings together a very natural group of species, and if separated from the rest, would form, of itself, a very natural genus, susceptible of further subdivision towards facilitating the discrimination of its species. My acquaintance with the other sections of the genus, is too limited to admit of my offering any remark on them.

As remarked above, the tubular flowered species, are principally confined to America, while those with deeply parted corollas, or even polypetalous flowers, are principally of Asiatic origin. Some of the latter

are objects of considerable beauty, as regards flowers, and as ornamental shrubs are really very handsome well deserving a place in every shrubbery. They are rich looking bushy plants, abounding in bright green foliage and flower freely in their seasons: *S. pulchra*, departs from the usual character of the genus, in its diffuse rambling habit, but is truly most beautiful. It grows near streams, below Sisparah. The figure gives no idea of the beauty of the flowers, as seen on the growing plant. *S. Gardneriana*, is a pretty tree with a fine spreading head which, during the flowering season, (February,) appears almost a mass of flower. It occurs in the small woods between Pycarrah and Nediwuttum. *S. microphylla*, forms a very pretty ramous shrub, about 6 or 8 feet high, also flowering in February, Mr. Gardner and I found it near the tops of the Hills behind the Avalanche Bungalow, on the banks of streams. *S. obtusa*, is not unfrequent in the woods or Shollahs about Ootacamund. The specimen figured was taken from a tree growing in one of those Shollahs behind Kelso Cottage. It is truly a beautiful tree, when in full flower, being covered from the base with ascending branches, loaded with its numerous short racemes of pure white flowers.

SYMPLOCOS PULCHRA (R. W.) shrubby, diffuse: ramuli, leaves, peduncles and bracts clothed with long brownish hair: leaves ovate, oblong acuminate, slightly cordate, setosely serrated: peduncles axillary filiform, several flowered (3-4) calyx lobes ciliate, corolla glabrous, ovary pubescent, 3 celled.

Sispara on the Western slopes of the Neilgherries, on the banks of streams, flowering in February.

A beautiful species, the snow white flowers contrasting with excellent effect with the brownish tawny coloured under surface of the leaves.

SYMPLOCOS GARDNERIANA. Arboreous, ramuli ferrugenio-tomentose: leaves petioled, elliptic acuminate, denticulate, glabrous above, tomentose on the costa beneath, pubescent on the lamina, veined, (4th series of veins visible under the lens): racemes axillary, about half the length of the leaves; flowers crowded, bracts, bracteols and calyx tomentose: style the length of the stamens, stigma capitulate.

In woods between Ootacamund and Pycarrah, on the Neilgherries, flowering in February. A considerable tree of great beauty when covered with its numerous white flowers and deep green leaves.

SYMPLOCOS MICROPHYLLA (R. W.) fruticose ramous glabrous: leaves elliptic, obtuse, serrated, coriaceous, glabrous, or with a few hairs on the costa beneath: racemes axillary about twice the length of the petiols, pilose: bracts ovate, obtuse, and like the calyx pubescent, lobes of the calyx suborbicular, ciliate, corolla scarcely longer than the stamens.

Neilgherries, high on the hills behind the Avalanche Bungalow on the banks of small streams, flowering in February.

A very ramous bush 5 or 6 feet high, and when found was covered with its numerous fragrant white flowers, leaves from 1 to 1½ inch long, and from 8 to 10 lines broad, slightly crenato-serrated. Fruit I have not seen.

SYMPLOCOS OBTUSA. (Wall.) leaves elliptic, obovato—orbicular above tapering towards the base, subdenticulate: racemes axillary, twice the length of the petiols, simple and like the flowers glabrous: lobes of the calyx roundish.—Leaves 3 inches long 12-15 lines broad, veins prominent beneath, no quaternary ones: bracts caducous: tube of the calyx obconical, flowers subsessile, lobes of the calyx ciliolate.—*D. C. Prod.* 8, 256.

Neilgherries, frequent in woods about Ootacamund, flowering during the dry season, April and May.

OLEACEÆ—OLIVE-TRIBE.

In this tribe, the Flora of the Hills is rather rich, seven or eight species being found on them, belonging to three or, according to De Candolle's view, 4 genera. This order, though as a whole, not a large one, including, however, nearly 150 species, is yet one which is very interesting, as embracing within its circle, several rather unusual combinations; here we have regular monopeltalous flowers, with only two stamens, which is rare: here we have an apetalous genus in the Ash: and here, in two sections of the same family, we have the plants of the one distinguished by having pendulous ovules and albumenous seed, while those of the other, have ascending ovules [that is, ovules attached nearer the base than apex,] and exalbumenous seed. Yet in spite of these discrepancies the whole are held together by what seems an indissoluble family tie—the facility of grafting on each other. On this subject, De Candolle forcibly remarks; however heterogenous the Oleaceæ may appear as at present limited, it is remarkable that the species will all graft upon each

other, a fact which demonstrates the analogy of their juices and fibres: thus the Lilac will graft upon the *Ash* the *Chionanthus* and the *Fontanesia* and I have even succeeded in making the Persian Lilac live 10 years, on *Phillyrea latifolia*. The Olive will take on the *Phillyrea*, and even on the Ash, but we cannot graft the Jasmine on any plant of the Olive tribe, a circumstance which confirms the propriety of separating these two orders." There certainly can be no doubt or hesitation, in admitting the propriety of their separation, for in truth the only bond of union between the two families consists in both having regular monapetalous diandrous flowers, in all other points they are sufficiently distinct. Lindley even places them in different alliances, considering the Olives more akin to the Solanums and the Jasmines to the Borages and yet, in some essential points, the line of separation is almost imperceptible. The Jasmines for example, like the last section of Olives, have usually ascending ovules, and exalbumenous seed, some however, have the ovules suspended or actually pendulous; but on the other hand, their flowers in all points, except the stamens and carpels, show a quinary tendency; while those of the Olives are as constantly quaternary: the carpels of the former, as they advance to maturity, have a tendency to separate and produce two berries from one flower, while in the Olive they remain united, producing only one. This tendency to separation is considered characteristic of the Borages, while union is viewed as the constant character of the Solanums, and on these premises, Lindey's arrangement may rest on a firm foundation, though I confess, I am unable to trace the relationship.

The Olive tribe has a wide geographical range, but evidently gives the preference to the more temperate climates in both hemispheres, while many show a predilection for the warmth of the tropics; most, however, of the peninsular species, are found either on the higher ranges of hills, or in the cool shady jungles of the lower ones, very rarely if ever extending to the open plains. Of the European forms, the Ash is that which attains the highest latitude, but the Privets and Lilacs are hardy enough to endure the climate of Britain one of them, the common Privet, being a native of England.

The true Olive is famed for its oil, and every one knows the fruit as a preserve. Its bark also possesses medicinal properties. Manna is produced from the bark of several species of Ash and the Lilac possesses, in an eminent degree, the febrifugal properties of Peruvian bark. In the arts, the timber of all the larger trees is considered excellent and is in general use. That of the true Olive is spoken of as indestructible!

OLEA.

Calyx shortly tubular, 4 toothed. Corolla hypogynous, shortly campanulate, limb 4-cleft, or 4-parted, rarely wanting. Stamens 2, attached to bottom of the tube exserted, hypogynous in apetalous species. Ovary 2-celled, with 2 collateral ovules in each, pendulous from the apex of the partition. Style very short, stigma bifid, laciniæ entire or emarginate, Drupe baccate, one or two seeded by abortion, putamen bony or fragile papery. Seed inverse, Embryo straight, in the axis of a fleshy or subfarinaceous albumen, and about the same length. Colyledous foliaceous radicle superior,—trees and shrubs with opposite entire, coriaceous leaves and axillary fascicled racemose or panicled flowers.

I have here retained the genus as defined by Professor Endlicher, and adopted his character in preference to that of De Candolle, who constitutes the species here figured, the type of a new genus, on account of

its sparingly fleshy fruit, and fragile papery not bony putamen, distinctions which I can scarcely consider of generic value, especially in a genus where we find considerable variation in the texture of the putamen, as well as in the fleshyness of the fruit. If the fruit of the cultivated Olive, is to be taken as the type in that particular, then, it is my impression, nearly all the Indian species may be removed.

As the genus stands in De Candolle's Prodromus, it includes 29 species, but 7 of these are imperfectly known, and may not belong to it, or if they do, may have been previously described under other names. In its geographical range, it is widely distributed—Europe, Asia, Africa, Australia and North America; all claim species. The one here figured was formerly described by Roxburgh under the name of *Phillyrea*. Endlicher reduced that genus, referring the species to *Olea*: DeCandolle has, however, taken a different view and not only retains both, but constitutes of Roxburgh's Indian *Phillyrea*, a new genus under the name of *Visiania*, which I cannot but view as a needless multiplication of genera in an order where such multiplication does not seem called for, either by the number of its species or by the complex differences of form and habit they present.

The Olive tree has long been looked upon with something approaching to veneration, as the emblem of peace and the terrestrial type of durability, the tree itself being one of those that attains the greatest age, and its timber being almost indestructible by the ordinary processes of decay. Every body knows the valuable Olive oil and most people are more or less intimately acquainted with the Olive itself as it comes to us preserved in a solution of Salt or Vinegar. I have never heard of any of the Indian species being employed for any purpose except as timber and the wood of some of them is said to be exceedingly close grained and durable.

1242. OLEA ROBUSTA. (Wall. *Phillyrea robusta*, Roxb. *Visiania robusta* D. C.) leaves elliptic, oblong, acute at the base, acuminated at the apex, entire: panicles terminal, large, diffuse; rachis and pedicels pubescent: style clavate: fruit subcylindrical.—Arboreous, wood very hard, leaves 3-4 inches long, 1 to 1½ broad, flowers [illegible] fruit size of a bean.

According to Roxburgh, this tree attains in Silhet a large size, and furnishes the natives with a very durable timber. In Southern India, this, so far as I have seen is never the case, the thickest stems, and these short, rarely exceeding the thickness of a man's thigh.

The genus Visiania of De C
Olea in the fruit. He remar

LIGUSTRUM—PRIVET-TREE.

Calyx shortly tubular, 4-toothed deciduous. Corolla funnel shaped, tube longer than the calyx, limb 4-parted. Stamens two inserted within the tube of the corolla inclusa. Ovary 2, with 2 ovules, pendulous from the apex of the septum, in each. Style very short. Stigma bifid obtuse. Berry globose, 2-celled, cells 2 seeded or by abortion, 1 seeded. Seeds inverse, ovate or angled, embryo straight, in the axis of a subcartilagenous albumen. Cotyledons subfoliaceous ovato-lanceolate. Radical terete superior.—Trees or shrubs with opposite short petioled, ovate oblong, or lanceolate entire leaves: flowers, in terminal panicles or thyrses white: flesh of the fruit sparing, oily; hence showing an affinity with the Olive.

This is not an extensive genus, 9 species, only being yet known and some of these so very like, that it seems doubtful whether they are not kept distinct rather on the ground of geographical distribution than on botanical characters. As a whole it seems very nearly allied to Olea, almost the only appreciable difference being the greater length of the tube of the Corolla in Ligustrum. The flesh of the drupes in both is oily, and the putamen more or less bony.

The Privets are handsome, very ornamental shrubs, on account of their compact form when not in flower, and owing, when in flower, to every branch ending in a rich cluster of white flowers. The one here

figured, is very nearly allied to the common English Privet, so much so indeed, that, I suspect, if seed were silly sown in England and they were found competent to bear a European winter, they would almost pass for the English one. Curiously enough these pretty shrubs have not yet been methodically introduced into the hill gardens, though so ornamental and growing so freely in nearly all soils and exposures.

LIGUSTRUM PERROTTETII (D. C.) branches puberulous at the apex, leaves elliptic, obtuse at both ends, or subacute, glabrous, succulent, the thyrses terminating the branches, compound, compact.—D. C.

Neilgherries, frequent: to be met with in nearly all situations, on hilly pastures and banks of rivulets, and very uniform in its habit in both.

A ramous leafy shrub, from 2 to 4, or 5 feet high, leaves from 1 to 1¼ inch long, by about 6 to 8 lines broad, of a dark green color, usually obtuse at both ends, but occasionally somewhat acute: ramuli numerous, short, each terminating in a compact thyrse of fragrant white flowers: fruit oval, obtuse at both ends, about the size of a small bean.

D. C. hints that perhaps *L. Nepalense*, is a native of the Neilgherries; I have not met with any plant corresponding with his character, "branches softly villous," and "leaves villous beneath."

LINOCIERA.

Calyx minute, 4-cleft. Petals 4 linear, or oblong, elongated, united by pairs at the base, through the medium of the stamens. Stamens two, uniting the base of the petals, inclusc. Ovary 2-celled, 4-ovuled, style very short, stigma emarginately 2-lobed. Drupe baccate, 1-celled by abortion, 1-seeded: putamen, thin sulcately striated. Seed inverse exalbumenous. Colyledons plano-convex thick, radicle very short, superior. Glabrous shrubs or, rarely, trees with opposite simple entire leaves: peduncles axillary, or terminal racemose or panicled: corolla white yellow or purple.

The two preceding species belong to the section *Oleinea*, having albumenous seed, this belongs to *Chionanthea*, having them exalbumenous, they differ moreover in the ovules in this being less decidedly pendulous, or in other words, attached below the apex, and in the one here represented, they are even attached below the middle, so as to become ascending, approaching, in that respect, the character of Jasmines, but though, in that particular structure, there is a point of affinity, there are more important ones keeping them apart. I therefore quite agree with those who view the two families as distinct. The genus *Linociera*, is divided between America and Asia, but preponderating in the latter. From *Chionanthus*, it seems scarcely distinguishable by characters, but we are saved the trouble of distinguishing, all the *Chionanthi* being from America. Three species described under that name by Roxburgh, have all been removed to *Linociera* by De Candolle. The accompanying species is very common on the Eastern slopes of the Neilgherries, and may be equally so elsewhere, a point on which however, I cannot speak with certainty, as I have only recently discovered that it was a new species of this genus, having for a long time supposed it to be *Olea Roxburyhii*, which it much resembles.

1245. LINOCIERA INTERMEDIA (R. W.) leaves elliptic, acuminate at both ends, long petioled: panicles axillary, diffuse, about as long as the leaves: flowers aggregated on the points of the ramuli, sessile, often male by abortion: ovules ascending, stigma capitate, 2 lobed, fruit oval, one seeded.

Eastern slopes of the Neilgherries frequent, flowering during the rainy season.—Arboreous, glabrous, leaves opposite, from 6 to 8 inches long, including the petiol, panicles axillary, varying much in size, the larger one being about the length of the leaves, flowers numerous, white, frequently sterile by abortion, and then the panicles attain their greatest size; fertile panicles are generally shorter than the leaves. Flowers small: ovules ascending. I am uncertain whether this last structure is general throughout this 'Tribe,' but if so, the direction of the ovules afford a mark by which it can, when in flower, be distinguished from the Oleineæ: ovules ascending in this, pendulous from the apex of the cell in that.

This species seems exactly intermediate between *L. macrophylla* and *ramiflora*, but is more nearly related to the former.

JASMINEÆ—JASMINE-TRIBE.

This small order is pre-eminently Indian, and is found scattered all over the country and in the Southern Provinces, extending from the shore to the tops of the highest

mountains, one being found in the woods about Dodabet, and that so nearly allied to I. *arcuatum*, a const plant, that I was for some time inclined to look upon them rather as varieties than distinct species. They both belong to the 3-foliolate division, both have 2 ovules in each cell of the ovary and, almost invariably, one of these cells abort in its progress towards maturity, leaving a single berry, sometimes 2-seeded, in place of a double one, so common in the genus. Thus agreeing in so many points, it may still be doubted whether my first impressions were not the more correct, in which case we should have a species equally adapted to the plains of India, and to a climate almost European in its temperature. The genus *Jasminum*, includes nearly one hundred species, exclusive of eight named, but undescribed species.

Its station in the vegetable kingdom seems still undetermined. Hitherto it has been considered little more than a section of *Oleaceæ*, and, unquestionably, but, for its unsymmetrical flowers, it could scarcely be kept distinct, since, in both families we find erect or at all events ascending and pendulous ovules, and a whole section of the Olives, with exalbumenous seed; showing that no weight can be attached to the position of the ovules, those of some Jasmines being descending; nor to their seed being albumenous, as the same structure exists in the other. But the symmetrical quaternary flowers and valvate æstivation of the one and the unsymmetrical flowers and contorted æstivation of the other, at once shows how widely distinct they are in nature. According to my view, they are evidently more nearly related to *Apocynaceæ*, than with *Oleaceæ*, but according to Lindley, their true affinities belong to neither, but to the Borages a relationship which I confess I cannot so clearly make out.

India is certainly the native country of Jasmines, but a few extend to Africa and New Holland, two are natives of Europe and of South America. Their trailing habit fitting them so well for arbours combined with their profusion of beautiful fragrant flowers, have always secured much consideration, for this beautiful family of plants. The flowers of some of them yield a fragrant essential Oil, and the Orange coloured tube of the Nyctanthes is used as a dye. And who in India has not seen the fragrant ornaments for the hair and necklaces formed of their flowers, and considered by native women, on occasions of dress and ceremony, their chief decorations.

JASMINUM.

Calyx campanulate, 5-8 lobed, teeth sometimes subulate, sometimes short. Corolla salvour shaped; tube terete, limb flat 5-8 parted, lobes oblique, contorted in æstivation. Stamens two adnate to the tube of corolla inclusc. Ovary 2 celled 1-2 ovuled: ovules erect, ascending lateral, or sometimes pendulous. Style simple, 2 lobed at the apex. Berry didymous, cells 1 or, rarely, 2 seeded. Seed erect exalbumenous.—Erect or scandent shrubs: leaves opposite or rarely alternate, all compound, or occasionally the petiol jointed in the middle, and bearing one leaflet, or sometimes bearing from 3 to 7 leaflets, and then the leaves are 3 foliolate, or unequally pinnate: panicles few or many flowered corolla, yellow or white, sometimes redish externally.

The bulk of this character is copied from De Candolle, but to render it applicable to the genus, as I have found it in India, it was necessary to introduce a few words regarding the ovary and ovules. In the original

"Ovarium bilobum," is all that is said regarding that important organ, and that little is not in accordance with my experience, the ovary not being two lobed, when the flower drops, though the fruit, owing to a peculiarity in its mode of growth, afterwards becomes two lobed. The number and position of the ovules, as here stated, differ from the generally received character. In Endlicher's Genera Plant, it is said, "Ovula in loculis solitaria e basi dissepimenti adscendentia anatropa." This is only partly right as I have found many with 2 ovules in each cell, and one, perhaps accidentally, with three; some with them positively pendulous, from near the apex of the cell, and several with them lateral, but attached above the middle, so as to be in truth descending not ascending ovules, but few indeed, if any, really erect, that therefore I consider of rare occurrence, as compared with the other structure.

Much importance was at one time attached to the position of the ovules in this genus, as compared with those of the Olives, on the supposition that they supplied adequate ground for separating two groups of plants, which the eye told were not true members of the same family, but which, the reason failed in finding distinctive marks to separate. As an ordinal even as a generic character, it seems to me of no value; and if employed as a specific one, except in a few extremely well marked cases, would probably often mislead. For these reasons, it must be discarded in practice, and other and more satisfactory ones sought for. The quinary formation and convolute æstivation of flowers of the Jasmines, as compared with the quaternary structure and valvate æstivation of the Olives supply very sufficient distinguishing marks.

1251. JASMINUM ERECTIFLORUM (Alph. D. C.) glabrous, leaves ovato-lanceolate, subcordate, long, acuminate: peduncles on the ends of the branches, ternate; with from 5-7 erect condensed flowers on the apex: bracts linear, subulate, somewhat longer than the pedicels: lobes of the calyx 6, linear subulate: tube of the corolla 3 times longer than the calyx; lobes 6-7, oblong, acuminate, half the length of the tube.—An extensively scandent shrub, extremities of the branches 4 sided, leaves 3-5 inches long, 15-20 lines broad, petiols 4-6 lines long, pointed near the base: cymes shorter than the adjoining leaves: bracts and lobes of the calyx erect: flowers white, fragrant. —*Alph. D. C. in D. C. Prod.*

Neilgherries, ascending to an elevation of about 6000 feet, flowering during the hot season.

This when in full flower is a very handsome species. Its large shining dark green leaves and numerous pure white fragrant flowers, render it a conspicuous object among the dense jungle in which it usually grows.

1258. JASMINUM REVOLUTUM (Sims. *J. Bignoniaceum* Wall. *J. aureum?* Don's Prodromus,) glabrous, not scandent, branches angled; leaves alternate, pinnated; leaflets 3, 5, 7, 11, ovate, or ovate oblong, acuminate: panicles terminal, opposite the leaves, corymbose: calyx acute and acutely denticulate, lobes of the corolla subrivolute on the apex—Flowers yellow, fragrant.—*D. C. Prod.*

"Var. *β peninsulare* (Alph. D. C.) leaflets obovate, oblong, narrowing at the base, acute at the apex, flowers few.—Neilgherries frequent. An erect shrub 2-4 feet high, flowers solitary, or three or four together.

Neilgherries, abundantly distributed all over them, and always to be met with in flower, but in greatest perfection during the rains. Under the name *J. revolutum*, perhaps, two species are confused, but as I am unacquainted with the original form, and as I infer that Alph. D. C. would not have referred this plant to it unless he had good grounds for so doing, I adopt his name, and bring here as a synonym Wallich's *J. Bignoniaceum*, which must be identical with Var. *β.* of Alph. D. C., though referred by his father to a different Section, as there is no other plant having the slightest resemblance to it on the Neilgherries. D. C. refers here *J. Chrysanthemum* Roxb. I also bring Don's *J. aureum* here, though doubtfully, as he says, the leaves are opposite, which however, I suspect is an error, as I have a Nepaul specimen, accurately according in all other points with his character, but with alternate leaves.

ASCLEPIADEÆ.

This order, which is one of great extent, and so clearly defined by nature that, except in the case of a few outlying genera, it can scarcely be mistaken, was separated from Jussieu's order, *Apocyneæ*, by Mr. Brown. The few genera known to Jussieu were combined by him with a number of others out of which three other orders, *Apocynaceæ*, *Loganiaceæ*, and *Theophrasteæ* have since been constituted, so that the order, as left by him, included the elements of four orders. Each of these has, within the last few years, been largely augmented, but more especially *Asclepiadeæ* and *Apocynaceæ*, some of the larger genera of which include nearly as many species as the whole compound order, as known to Jussieu, did. The number of genera appertaining to it, defined by him, amounted to 29 only, and these not all true congeners, *Theophrasta*, which now forms the type of a new order, being one of them. Lindley, in his Vegetable Kingdom, gives a list of 141 genera of *Asclepiadeæ*, and states the number of known species at 910, but which may now be set down at 1,000, or perhaps many more. Of that number, probably about one-fourth are natives of India.

Generally speaking, it is tropical in its habits, nearly all its species being either altogether tropical or confined to the warmer regions on either side of that zone; hence, I presume, their paucity on the more elevated regions of these hills. On the lower slopes, where they enjoy a warmer climate, they are more numerous. Within the limits indicated, Asia, Africa, America, and Australia, all claim many species as their own, and a few even extend as far north as Europe. In India, they are met with in all situations, equally on the coast and on the tops of the highest mountains; on the banks of marshy rice-fields and arid stony ground; exposed to the full blaze of the sun's rays, and in the shady forest. Many of them are large twining shrubs with milky juice, but an extensive group, the *Stapelieæ*, is composed of square-stemmed, succulent, herbaceous, leafless plants, with acidulous, watery juices. The shrubby, twining forms are usually furnished with more or less succulent, opposite leaves, but several are leafless, or nearly so. It is however in the reproductive organs of this family that its most marked peculiarity exists, that by which it is distinguished from all the other orders of plants.

Like other dichlamydeous plants, the flowers of *Asclepiadeæ* have the usual calyx and corolla, the latter varying much in form in different genera, as will be at once seen by comparing *Ceropegia* with *Brachylepis*, or with the universally known *Calotropis*, the old Asclepias gigantea, so very common on the plains.

They have also, like other plants, stamens and a pistil, but both differing from the usual form, and presenting a structure peculiar to this tribe. The stamens have, moreover, in the plurality of species, a series of bodies, varying in shape, attached to them designated the staminal crown. These are very conspicuous in *Ceropegia elegans*, less distinct in the other species. And, lastly, the angles of the stigma are furnished with another series of bodies, designated stigmatic corpuscles. These are generally small, bright shining, brownish-coloured, oblong bodies, easily seen with the naked eye on looking closely into the flower.

The stamens, unlike those of most other plants have flattened filaments, which adhere by their edges, forming a tube round the ovary and style and are, apparently, without

anthers. The anther, in the generality of plants, is the yellow, powdery head, supported on the slender, thread-like filament, but here, on the contrary, it consists of two cavities, hollowed out of the apex of the filament, which, in place of containing a quantity of powdery pollen, are filled with two yellow, waxy-looking, gland-like bodies, attached, two and two, by slender prolongations to the corpuscles. These masses are the pollen of this order which, in this part of its organization, differs from all other exogenous plants: a similar structure is found to exist in the pollen of Orchideæ. The pollen masses, when removed from their cells and placed in favourable circumstances, produce numerous very slender tubes, which, entering the pores of the stigma, pass down into the ovary and there fertilize the ovules which it contains. These tubes can, with moderate skill in the use of the dissecting knife and microscope, be traced into the ovary. The removal of the pollen from the anther cell seems, in many, if not in all, instances a necessary preliminary to the production of the fertilizing tubes; hence, I presume, the paucity of fruit compared with the number of flowers. The ovary is double, or, in other words, the two carpels of which it is composed do not cohere in the axis, but remain distinct, the two apices only coalescing to form one large, usually pentangular, stigma, the angles of which bear the corpuscles. The fruit consists of two (sometimes only one, the other aborting) long, slender follicles (i. e. fruit opening along one side only), containing numerous flattened, pendulous seed, lying over each other like tiles on a house, each furnished at the apex with a tuft of long silky hairs, and presenting, when the testa, or skin, is removed, two leaf-like cotyledons ending in a pointed radicle. The leaves are in pairs, two and two, opposite; without stipules; and the peduncle, supporting the flowers, is not truly axillary but more or less removed from that point, between the leaves.

Endowed with structural peculiarities and habits so unique, the station of this order, in the vegetable kingdom, is still perhaps a problem to be solved, but in the present state of our knowledge, nearly all Botanists coincide in considering it more nearly allied to *Apocynaceæ* than any other. The younger De Candolle indeed goes so far as to say that the two orders are only kept apart by the difference of their pollen, showing how nearly they correspond in their general aspect and properties, when so acute an observer, after much study, has come to such a conclusion. It is one however which I cannot quite adopt, though I fully admit their near relationship. They seem also related to both *Jasmineæ* and *Loganiaceæ*, but are distinguished by having, like *Apocynaceæ*, a two-parted ovary and follicular fruit, and, usually, milky juice, none of which occur in these last-named orders.

Of their economical applications little need be said here. A few are employed in medicine; some yield dyes; one or two are celebrated for the tenacity of their fibres, which are made into cordage, bow strings, &c., and several are cultivated as ornamental plants, among which may be mentioned, *Asclepias curassavica*, so common in gardens in this country, but a native of America; and the fragrant West Coast creeper *(Pergularia odoratissima)*. To these ought unquestionably to be added, on these Hills, *Ceropegia elegans*, and *Decaisneana*, both beautiful flowering creepers—the former common about Coonoor and Kotergerry, the latter not unfrequent by the road side about a mile and a half below Sisparah. Besides these, there are several others of great beauty to be met with on the Hills equally worthy of this distinction. The other hill species of the order have little beauty to recommend them to like consideration.

CEROPEGIA.

Calyx 5-parted. Corolla tubular, more or less ventricose at the base, funnel-shaped; lobes of the limb compressed, strap-shaped, erect, often curved and cohering at the apex, not seldom ciliolate, valvate in æstivation. Staminal crown in a double series, campanulate or rotate, 5–10–15-lobed, the lobe opposite the anther, usually the longest ligulate, often approximated at the apex. Anthers simple at the apex, destitute of membrane. Pollen masses erect, roundish, pellucid on the inner margin. Stigma flat. Follicles cylindrical, smooth, of parchment-like texture. Seed comose.—Twining shrubs or herbs, roots usually bulbous, stems woody or succulent, leafless or, oftener, foliaceous: leaves often more or less succulent, flowers umbellate, greenish-white, mottled with purplish or violet spots, more rarely uniformly yellowish. —Decaisne, slightly altered.

Of this genus, Decaisne characterizes 38 species, 21 of which are natives of India and the Eastern Islands. To these I have since added 7 species, raising the number to 28, and my herbarium still contains some unpublished species; so that it seems not improbable, the number of Indian species, now in herbaria, exceeds the total number known to him. They are curious plants, especially as regards the reproductive apparatus, which is situated at the bottom of a long tube, and completely secluded from external influences, of a character suited to displace the pollen masses from the sacks of the anthers. This is accomplished by insects which can easily enter in search of the honey secreted at the bottom, but once in, they cannot return till the flower fades, owing to the tube being lined with stiff hairs directed inwards and downwards, like the wires of a mouse trap. Thus imprisoned, the restless little creature is made the medium of bringing about fertilization, which could not otherwise take place; after which the flower fades, the hairs lose their rigidity and collapse, liberating the little prisoner to repeat the operation in another flower.

Several of the species of this genus so closely resemble each other that it is occasionally difficult to distinguish them by their more obvious external marks. In such cases I have had recourse to the staminal crown which varies in different species, but is most constant in each. The value of this organ, for the discrimination of species, will be seen by comparing those of the four here given. The following brief description of that portion of the organization may be useful towards explaining the mode of applying its variations to the determination of species.

The staminal crown, when present, in this order, consists of 5 pieces, attached to the stamens and alternate with the lobes of the corolla. In *Ceropegia* it appears to consist of a double series; the inner, of 5 pieces in the usual place, opposite or attached to the filaments; the outer, 10-lobed, or two lobes to each lobe of the interior. The inner series is generally much longer than the outer, but sometimes they are nearly equal, as in *C. elegans*; and then they are united by pairs to the inner one, and divided from each other. In other cases, the outer is much shorter than the other, with the lobes united for about half their length to each other, and free from the inner, as in *C. pusilla*; a third form is where the lobes of the outer are united nearly their whole length, strap-like, merely slightly cleft at the apex, as in *C. Decrismeana*; and in the fourth, *C. ciliata*, they are short, very broad, semicircular, and notched or emarginate. Other forms occur where the outer series seems wanting, having altogether coalesced with the inner. With the aid of these variations, the species are easily sub-divided into groups, which greatly facilitates their determination, as it is rare that similar looking, but distinct, species coincide in presenting both external and internal marks so nearly alike, as to leave it doubtful whether or not they are varieties of the same species, a common occurrence in other very natural genera.

CEROPEGIA DECAISNEANA (R. W.), twining, glabrous: leaves lanceolate, acuminate at both ends, acute, hispid above, from short scattered rigid hairs, glabrous beneath: umbels pendulous, 6-flowered, pedicels divaricated, longer than the peduncles, flowers large, ascending, mottled with purple spots, calyx lobes setaceous, corolla clavate, largely ventricose at the base, lobes of the limb cohering at the point: secondary lobes of the staminal crown about half the length of the primary, erect, slightly cleft at the apex, tipped with purple.

Neilgherries, on the road side leading from Sispurah to Malabar, but rare; flowering March and April. An extensively twining, somewhat succulent shrub, leaves from 6 to 8 inches long, about 1 broad; corolla nearly 3 inches long, about ⅓ of which forms the dilated base; secondary lobes of the crown yellow, tipped with purple without, deep purple within: follicles long and slender, not much thicker than whip cord.

CEROPEGIA PUSILLA (W. and A.), herbaceous, glabrous, erect, 2–6 inches high: root tuberous: leaves linear, lanceolate, succulent: flowers axillary, solitary, erect: corolla ventricose at the base, tube cylindrical, longer than the lobes of the limb: ex-

terior lobes of the staminal crown ciliate, shorter, the interior ones longer than the gynostegium: follicles erect, about two inches long, attenuated at the point.

Neilgherries, in pasture ground, but rare. I found it more abundant on the banks of the Picarrah river than elsewhere, but there too it requires to be closely looked for. The specimen figured is a large one of the plant.

Ceropegia ciliata (R. W.), suffruticose, twining: root tuberous, stems glabrous, leaves short, petioled, ovate, lanceolate, attenuated towards the point, coarsely pubescent on both sides, hairy on the veins beneath, ciliate on the margin: peduncles axillary, about half the length of the leaves, hispid, umbels 6-10-flowered: calyx lobes subulate, shorter than the ventricose base of the corolla: corolla glabrous, lobes cohering at the points, shorter than the tube: exterior lobes of the staminal crown emarginate, ciliate, interior ones clavate, recurved at the points: follicles about 3 inches long, linear, tapering towards the point.

On cliffs of rock at Katie Falls, Neilgherries, flowering June and July. The ciliation of the margins of the leaves, a constant, though, from the shortness of the hairs, not a conspicuous, feature in this plant, has unfortunately been altogether overlooked by the artist: in other respects the figure gives a correct idea of the plant.

Ceropegia elegans (Wall.), twining, glabrous, leaves ovate-oblong, or oblong-lanceolate, attenuated or shortly acuminate, acute, somewhat succulent, ciliolate: peduncles equaling the petiols, few-flowered: tube of the corolla ventricose, curved at the base, purplish speckled; lobes subdeltoid, acuminate, cohering at the apex, often ciliate: exterior lobes of the staminal crown, ligulate, approximated, interior ones longer, inflexed, more or less united at the points: follicles very long, slender, glabrous, subtomulose: pollen masses brownish-coloured.—*D. C. Prod.*, 8, 642.

Neilgherries, frequent. The specimens figured were gathered in Kotergherry, on the Eastern descent. I have however met with it in many other places. It varies considerably in the colour of its flowers, the limb being sometimes purple, at others pale, the ciliæ are as often wanting as present, and seem to separate readily.

BÆOLEPIS.

Calyx 5-parted, corolla wheel-shaped, limb 5-parted, throat furnished with 10, or by cohesion of pairs, 5 minute scales at the bottom of the sinuses; throat bound with a ring below the scales. Filaments short, broad at the base, narrower above, each bearing a flat, bifid, appressed, coronal scale. Anthers cohering to the margin of the stigma, terminated by membrane adhering at the apex. Pollen masses ten, oval, granular, attached by pairs to the dilated, funnel-shaped limb of the corpuscle. Stigma muticous, depressed, 5-angled. Follicles divaricated, smooth.

Twining shrubs; ramuli pubescent: leaves opposite, oval, abruptly acuminate, the younger ones pubescent, adults glabrous, shining above, parallelly veined. Cymes interpetiolar, small, tomentose, divisions afterwards elongating, spike-like: flowers small, crowded; calyx and corolla externally hairy: segments of the corolla triangular, acute, purple within, spreading during the day, afterwards partially closing, becoming sub-campanulate.

The species here represented is the only one, yet known, appertaining to the genus, and, so far as I have seen, is only found on the Neilgherries. It is common about Kotergherry and readily recognized by the very dark green colour of the upper surface of the leaves, and their pale under surface, added to the almost whitish, very hairy young shoots and inflorescence which nearly conceals the very small, almost inconspicuous, flowers, except, during clear weather, when fully expanded; they then become conspicuous owing to their dark colour, contrasting with the light colour of their supports. The examination of fresh specimens enabled me to detect some errors in our original generic character which, however, were unfortunately overlooked, when preparing the analysis, which was not made under my eye, and not corrected when sending it to the press. The points requiring alteration were what relates to the pollen masses, and coronal scales. The former, in the original character, were stated to be four to each stamen, but which in several flowers I examined, I have always found limited to two, of an oval form, attached by one end to the dilated, cup-like limb of the funnel-shaped corpuscle, the pollen granular. The latter seems to have been overlooked in our former dissection, apparently, owing to their lying flat on the back of the filament. Another point, requiring emendation, was the character of the inflorescence which, in the original specimen, was two young to exhibit it correctly. At first it is truly cymose, but at length, through the elongation of the divisions, acquires a spike-like form, or in other words becomes cymoso-spicate. The points of the stamens, which adhere so as to form a kind of vault over the stigma, are not the true anthers but rather prolongations of the connectives beyond the cells of the anther.

This generic name was, in the course of a few years, given to three distinct genera; first, in 1829, to a genus of *Chinopodiaceæ*; secondly, in 1833, to one of *Asclepiadeæ*, and, lastly, towards the end of 1834, to the plant here represented.

When I published this plate in my Icones, I was not aware of the existence of the first of these genera, and the second had been already reduced by its authors. It now becomes necessary to change the generic name given on the plate, to that at the head of this article, and as I have altered it in the following note on the species.

HEOLEPIS NERVOSA (Dcne, MSS. *Brachylepis nervosa*, W. and A.); young shoots and under surface of new leaves clothed with soft pubescence: cymes very hairy, furnished with numerous minute bractiols.

Common on the Neilgherries about Coonoor and Kotergherry, and generally about that elevation, (6,000 feet). Flowers small, purple, surrounded with much whitish hair. Leaves very dark green and shining above, below reticulated with strong, dark-coloured veins, at first pubescent, afterwards glabrous.

APOCYNACEÆ.

This is a large order, for the most part tropical in its habits, but complex in both its forms and properties. Here we find growing, side by side, small annuals and handsome trees, erect shrubs, and delicate twiners. Among its species, on the one hand, is found the intensely poisonous Tanghin *(Cerbera Tanghin)* of Madagascar, the kernel of whose fruit is justly placed among the most deadly of vegetable poisons, in as much as it is said one of them, though not larger than an almond, is enough to poison 26 men; and on the other, the Cow-tree of equinoctial America, which, when wounded, pours out a copious stream of sweet innoxious milk. Between these extremes, almost every shade of variety is found. The common Oleander is highly poisonous; the milky juices of the Plumerias (common in India), and *Allamanda cathartica* are purgatives, while in large doses they are strongly emetic and poisonous; others are mildly emetic. Some are aromatic, resembling Canella alba; or tonic, and used as substitutes for Cinchona. The roots of *Ichnocarpus frutescens*, a common Indian plant, are used as a substitute for Sarsaparilla. The wood of *Alstonia scholaris*, another common Indian tree, is as bitter as gentian. The fruit of *Willughbeia edulis* are, as the name implies, edible, and those of *Carissa Carandas* (the common Calacca) furnish a substitute for red currant jelly, and, which I state from my own experience, not a bad substitute for Damsons, when preserved by boiling in syrup.

In former days, when European tart fruits were less abundant than now, I have often treated my guests to Calacca tarts, from fruit so preserved, which were then much esteemed. This brief enumeration of characters and properties will suffice to show how variable this family is in its forms and properties.

The order was first defined by Jussieu, but so loosely, and made to contain so many dissimilar forms, that it has since been broken down, and the elements of four orders derived from the genera associated by him under one name. Three of these, *Asclepiadeæ*, *Apocynaceæ*, and *Loganiaceæ* find a place in this work. At a time when the known flora of the world, scarcely amounted to 10,000 species, and natural affinities were less understood, no great inconvenience was experienced from such extreme complexity of natural orders. But now that the number has been increased ten-fold, it has become necessary to investigate minute points of structure with untiring perseverance and skill with the aid

of most powerful microscopes. In this way the science has assumed a new form, numerous new orders have been constructed, and nearly all the old ones vastly enlarged. It thus soon became apparent that Jussieu's *Apocyneæ* could not be retained in the state left by him and, fortunately for science, the analysis was undertaken by our justly celebrated countryman, Mr. Brown, then and still, though now descending into the vale of years, having already passed the allotted age of man, threescore years and ten, the first of living Botanists. Forty years ago his memoir on *Asclepiadeæ* and *Apocyneæ* was published. In that paper he clearly defined the limits of the two orders, and shortly after, in his immortal Prodromous, he indicated the existence, among Jussieu's Apocyneæ, of a third order, *Loganiaceæ*, which is now universally adopted.

On that occasion he took up only one section of the order, that namely, most resembling *Asclepiadeæ*, as having follicular fruit, and the seed crowned with a tuft of down: and of the genera then referred to it, only one has since been removed, and transferred to the transition section, *Periplocæ*, of *Asclepiadeæ*, through the medium of which the two families almost interblend. A second nearly allied genus, subsequently established by him and similarly referred to *Apocynaceæ*, has also been removed. With these exceptions, all the subsequent most careful examinations have only tended to confirm the minute accuracy of those primary observations, undertaken at a time when minute microscopic investigations were less in vogue than they have, under his guidance, since become.

The order, as now known, includes about 100 genera and 600 species; of these the greater number are of tropical origin, a few only extending far into the temperate regions. Such being the case, a few only, as might be expected, are found on the higher ranges of the Hills. On the upper slopes they are more numerous, but it is not until we descend into the deeper vallies and plains that they form a distinct feature of the vegetation.

In its botanical relations, the family seems well located in its present place in the system of plants. *Apocynaceæ* are very distinct in their sexual apparatus from true *Asclepiadeæ*, but are occasionally scarcely distinguishable from the section *Periplocæ*, of that order, either by structure or habit, so that the transition from the one to the other is complete; and on the other side they pass equally imperceptibly into *Loganiaceæ*, though, in their more perfect forms, readily distinguishable from both.

In *Asclepiadeæ*, the sexual apparatus is all combined, the male and female parts being intimately associated in the centre of the flower, requiring both knowledge and skill to distinguish and separate them. In *Apocynaceæ*, they are readily distinguishable, but, for the most part, the stamens converge round the capitate stigma to which the anthers more or less adhere; while in *Loganiaceæ* they are quite free and distinct. In all the three orders the leaves are opposite, but in the two former without stipules, while in the latter there is usually a sheathing stipule within the petiols.

Among the *Apocynaceæ* there are many very handsome flowering trees and shrubs, qualities in which the Hill ones can scarcely be said to participate, though I believe, with some care in the culture, some of them might be rendered rather ornamental additions to the shrubbery. So far as I am aware, none of the Hill ones merit consideration for their properties. *Wrightia tinctoria*, from the leaves of which an Indigo is obtained, is common at the foot of the Hills, where also is found *Alstonia scholaris*, already mentioned, as distinguished for the intense bitterness of its wood.

WRIGHTIA.

Calyx 5-parted, with 5 scales or glands at the base, of which two are opposite the base of the 2 interior lobes, and the 5th opposite the edge of another lobe, hence they are all nearly alternate with the lobes of the calyx. Corolla 5-cleft, tube usually short; lobes twisted to the right *in* æstivation; throat crowned with appendages, equal or unequal, in the latter case the larger ones opposite the lobes of the corolla. Stamens 5, inserted on the middle or throat of the tube, protruding; filaments short; anthers sagittate, adhering to the middle of the stigma, ending in a short acute hairy point. Nectary none. Ovaries 2, adpressed, glabrous; style filiform, dilated at the apex; stigma obtuse, sometimes bifid. Follicles two, long, either cohering or distinct, sometimes cohering at the apex only. Seeds numerous, oblong, furnished with a tuft of hair at the interior extremity; coat of the seed double, exterior one somewhat striated longitudinally, soft, with 1 furrow, the interior one (albumen?) pellucido-membranaceous, covering the embryo on all sides; albumen none; radicle superior, short; cotyledons oval, cordate, longitudinally plicate, convolute to the right, much longer than the radicle.—Shrubs or trees, natives of India and Australia; wood white; leaves opposite, entire; cymes terminal; embryo, when immersed in water, becoming reddish violet.

This genus of rather fine flowering trees and shrubs, contains 15 defined species, two or three of which are found on the lower slopes of the Hills. The present one is rarely, if ever, found so high as Coonoor, but is not unfrequent by the road side lower down. It also occurs on the Shervaroys at Salem. Its white flowers, short, leafy, not fimbriated crown, and cohering follicles, at once distinguish it from the much more common *W. tinctoria*, which, however, seldom attains the same elevation that this does. This is further distinguished by generally appearing as a shrub while the other is a moderate sized tree.

In the appearance of the flowers, it somewhat resembles *W. mollissima*, which has dull-reddish flowers. *Wrightia tinctoria* is remarkable for furnishing a very good Indigo, of which considerable quantities are annually prepared by Mr. Fischer of Salem. The wood of *W. mollissima* is employed in the North of India by turners, while the yellow juice of *W. tomentosa* furnishes, according to Roxburgh, a permanent yellow dye. It does not appear that medicinal properties have been found in this genus. In the Wallar jungles, where the *W. tinctoria* abounds, considerable quantities of a coarse Indigo are extracted by the Natives, by whom the tree is called Nilum Pál, literally, as I understand, blue milk, in allusion, I presume, to an idea that the white milky juice of the tree becomes converted, in the process of extraction, into the blue dye.

WRIGHTIA WALLICHII (Alph. D. C.), leaves elliptic-obovate, acute at the base, obtusely acuminate, pubescenti-tomentose: cymes tomentose: lobes of the calyx broad ovate, rounded, externally pubescent, half the length of the glabrous tube of the corolla, the ovately rounded scales about half the length of the lobes: coronal appendages 10, ligulate, glabrous, unequal, the larger ones opposite the lobes, 3 crenate at the apex, about 4 times shorter than the lobes, the alternating ones a little shorter and narrower, 2-cleft: anthers hairy on the back.—Branches terete retuse towards the extremity: leaves 3–4 inches long, 15–18 lines broad, smoothish above, pur-purescent tomentose beneath, petiole 2–3 lines long: lobes of the corolla velvety: follicles about half a foot long, connate, cylindrical, rough with white spots, pointed.

Slopes of the Neilgherries—flowers white. Plants of this occur by the road side from about the middle of the ascent to the elevation of between 4,000 and 5,000 feet. The upper surface of the leaves, which in the figure is represented glabrous, is clothed with very short pubescence, giving them a velvety feel.

The original specimens of this species were collected in the Tenasserim provinces, but the Neilgherry ones do not seem to differ, at least not specifically.

CARISSA.

Calyx 5-parted, or deeply 5-lobed, without glands at the base, two of the lobes exterior. Corolla salver-shaped, lobes twisted in æstivation, tube hairy within, throat sometimes bearded. Stamens 5; anthers lanceolate, obtuse or apiculate. Ovary single, 2-celled, with 2 ovules in each; style filiform, glabrous, thicker above; stigma 2-lobed, hairy, caducous; ovules few, attached to the partition, amphitropal. Berry globose or ellipsoid, 2–4-seeded. Seed peltate, rough, albuminous. Embryo axile, straight, parallel to the linear hilum; radicle inferior; cotyledons ovate, about the length of the radicle. Ramous shrubs or small trees, lactescent, natives of Asia, Australia, and Africa. Branches dichotomous, spreading. Leaves opposite, entire, short petioled; spines opposite, sometimes bifurcated at the forks of the branches, changed above into floriferous peduncles.

Peduncles dichotomous, shorter than the leaves, often terminating the branches, or axillary, or extra axillary in the place of the spines. Flowers white, somewhat resembling those of Jasmines, fragrant; lobes of the calyx subulate, ciliate.

This extended character is somewhat abridged from Alph. De Candolle's, in his Prodromus. It is perhaps more dilated than is necessary for distinguishing the genus, as I believe there is none (certainly none in India) with which it is liable to be confounded, but in a work of this kind brevity is not demanded. The genus is one of considerable extent, including about 30 species, but some of these imperfectly known. Alphonse De Candolle defines 20 as known to himself, and names 7 more as less known. In addition to these, my herbarium contains two or three undescribed species, and doubtless more will yet be found in both India and Africa.

The plant here represented is abundant on the hills, but particularly so on the slopes leading down to the Kaitie Falls, where it forms a perfect jungle on each side of the road. It is a low, spreading, thorny shrub, in flower at all seasons, bearing a small, when ripe, bright black berry, milky before maturity and, when ripe, having a rather agreeable sweetish-acid taste, and might, I have no doubt, like that of the *C. Carandas*, be used as a preserve, either as a tart fruit, or for the sake of its jelly; except that the seed are so large in proportion to the pulp, that a great many would be required to yield a small return. It is however a pretty plant, the delicate green leaves and white flowers, tinged with pink, contrasting well with the bright black berries. I would recommend it to the attention of those who wish to enrich their gardens with native flowers.

CARISSA PAUCINERVIA (Alph. D. C.), branches subdichotomous, armed: leaves elliptic, oblong, acute at both ends, mucronate, glabrous, short petioled, few-veined, oblique: peduncles terminal and axillary, much shorter than the leaves, 3-5-flowered; pedicels longer than the calyx, puberulous: calyx 5-cleft, slightly pilose, laciniæ lanceolate, acuminate.

Neilgherries, abundant near Kaitie Falls, flowering during the hot season, April and May, but I believe generally to be met with in flower. A low, somewhat diffuse, very ramous, thorny bush: leaves elliptic oblong, mucronate, smooth and shining, light pea-green, from ¼ to 1½ inch long, and about half as broad—flowers white with a slight dash of rose, berries about the size of a small bean, oval, dark purple.

OPHIOXYLON.

Calyx 5-parted, without glands, lobes linear, oblong, or lanceolate, erect. Corolla salver-shaped, much longer than the calyx; tube cylindrical, narrower at the throat, hairy within; lobes five, ovate, obtuse, twisted to the right. Stamens 5, inserted within the throat, inclusæ; anthers oblong, acute, longer than the filaments. Nectary cup-shaped, entire, undulated on the margin. Ovaries 2, compressed, connate at the base; ovules 2 in each, attached above the base; style 1; stigma ovoid, capitate, bituberculate at the apex, and fimbriate round the base and crown. Berries connate at the base, ovoid, 1-seeded, with a more or less rugous testa, embryo nearly as long as the seed, albumen fleshy (oily in *O. macrocarpa*, R. W.), cotyledons oval, lanceolate, or suborbicular; radicle pointing to the apex. Lactescent, erect, or twining shrubs. Leaves opposite or verticelled, oblong, acute at both ends, paler beneath, glabrous or sparingly pubescent beneath, cymes axillary, dichotomous, shorter than the leaves, many-flowered; pedicels short; flowers white or, with the calyx, reddish at the base. Berries black or red.

Of this genus, only one species was known in 1844, when De Candolle published the 8th volume of his Prodromus. Since then I have added 4 to the list, one from Ceylon, one from the Pulney Mountains, one from Belgaum, and the present, which is rather extensively distributed over the Neilgherries but most frequent, so far as I have seen, about Kotergherry, whence the specimen here represented was obtained.

It is a small, rather pretty looking shrub, conspicuous on account of bright dark green foliage, and small clusters of white flowers. In its general appearance it has no great resemblance to the original species of the genus, the rather celebrated *O. serpentinum* (the root of which is highly esteemed by Native practitioners as a remedy against snake bites, fever, and other affections), but an analysis of its characters shows that it clearly belongs to this genus, the above character of which is derived from the original species. According to Roxburgh, *O. serpentinum* is a large twining shrub, a form in which I have no recollection of ever having met with it, but on this point I refrain from speaking with any degree of confidence. I know that I have often seen it as a small erect shrub, and in that form it is not uncommon in gardens about

Madras. The *O. Neilgherrense* is always an erect, ramous shrub, seldom exceeding three or four feet in height; rare, if it occurs at all, about Ootacamund, but frequent at an elevation of about 6000 feet above the sea. As it is not improbable, the other two new Continental species may be found on the Mysore slopes of the Hills, I subjoin their specific characters as given in the Icones.

Ophioxylon Neilgherrense (R. W.), shrubby, erect, glabrous, rather sparingly ramous; the leaves confined to the terminal ramuli, older branches naked: leaves oblong, elliptic, broader towards the apex, acute at both ends, shortly acuminate, glaucous beneath: corymbs axillary, cymose, trichotomous, solitary or two or three together: corolla hypocrateriform, tube about twice the length of the limb, hairy within; lobes of the limb oval, obtuse: ovary 2-celled, cells cohering, 2-ovuled: berries connate at the base, 1-seeded, ovoid, dark brownish-purple when ripe: seeds oblong, tapering at both ends, bony, smooth.

Neilgherries. Frequent about Coonoor and Kotergherry, and generally over the hills about that line of elevation (6000 feet), flowering in greatest perfection during the rainy season, (July to September), but may be met with at most seasons. Flowers pure white, and usually accompanied by full-grown fruit. Fruit about the size of a small bean, 2-3 lines long.

My collection still contains two undescribed species, the specimens however are scarcely sufficiently complete for full description. One of these from the Pulney Mountains is not in flower, but is distinguished by its large fruit, the nuts of which are nearly half an inch long: the other, from Belgaum, is not in fruit, but the flowers are very different from the preceding species. These two may be thus designated and defined.

1. *Ophioxylon macrocarpum* (R. W.), shrubby, glabrous, leaves broad obovate elliptic, abruptly acuminate acute, corymbs axillary, lax: calyx lobes linear, subulate: nuts obovate, slightly compressed, tuberculed: corolla ——.

This species is nearly allied to both the preceding but differs in its large tuberculated nuts—4-5 lines long and 2 broad—which are fully twice the size of those of either of the above.

2. *O. Belgaumense* (R. W.), shrubby, erect, glabrous: leaves elliptic, oblong, obtuse or acuminate: corymbs long, peduncled, compact, many-flowered: flowers longish pedicelled: calyx 5-cleft, lobes dilated, imbricating: tube of the corolla long, slender, lobes of the limb before expansion involutely imbricated, forming a round capitulum: stamens inserted about the middle of the tube.

My specimen of this, which is a very indifferent one, was communicated by Mr. Law. It is allied to the alpine group, but quite distinct from the three preceding ones, as shown by its compact inflorescence, very numerous capitate alabastra and broad imbricating, somewhat truncated, lobes of the calyx. The fruit I have not seen.

LOGANIACEÆ.

This is a small but curious and complex order, apparently held together by negative rather than positive characters, made up of a series of genera, nearly all of which have at different times been referred to other families, but from which they are removed because they would not properly associate with them, and sent here as a temporary measure, until further discoveries enable future Botanists to group them into more clearly defined orders. Here we find associated, under one family name, plants the most unlike, goodly trees and minute herbs, not three inches high; plants with and without stipules; flowers with valvate, imbricate, or twisted æstivation; corollas regular and irregular; with one or as many as 12 stamens, five being the predominating number. These again are either alternate or opposite the lobes of the corolla. The stigma is more uniform and wants the glandular apparatus found in *Apocynaceæ*, which Lindley considers the true distinguishing feature between the two families.

The plants selected to illustrate the order are perhaps among its most genuine representatives. Another genus, *Strychnos*, is found on the lower ranges of the Hills, but rarely extends higher than Coonoor, and rare there, but common on the lower slopes. The nux vomica is common at the foot of the Hills. The properties of some of the plants of this family are intensely venomous, of which the seed of the well known nux vomica affords a good example. But while the seed, in even small doses, is highly destructive of animal life, the wood is intensely bitter and is prescribed in the case of inter-

mittent fever; and the pulp of the fruit is greedily devoured by many birds. This last seems one of the most curious circumstances connected with this interesting tree. The seed, beat up with the white of an egg, is applied externally by the Natives as a discutient. The seed of another species, *S. potatorum*, has the curious property, when rubbed on the inside of water vessels, of rapidly clearing muddy water, hence the common name of "clearing nut." Its young fruit is made into a preserve and eaten by the Natives, but when ripe it acquires, in a milder degree, the properties of other species and is then prescribed as an emetic. Nothing seems known of the properties of the other two Hill plants of this family.

The species of this family, with a very few exceptions, are of tropical origin, hence I presume their rarity on the Hills. One, however, another species of Gardneria, whatever more, is found in Nepaul and Silhet.

FAGRÆA.

Calyx bibracteate at the base, 5-cleft, lobes imbricated, obtuse. Corolla funnel-shaped, tube enlarged above, lobes oblique, twisted to the left in æstivation, afterwards spreading, reflexed. Stamens free, inserted on the middle of the tube; filaments subulate, protruding; anthers 2-celled, incumbent. Ovary imperfectly 2-celled; style filiform; stigma peltate with a depression in the middle. Berry fleshy, oval, placentæ pulpose. Seeds peltate, numerous, small, crustaceous, immersed in pulp; albumen copious, fleshy, or somewhat horny; embryo transverse, as regards the hilum, sub-cylindrical; cotyledons about the length of the radicle, linear.—Trees or shrubs, sometimes twining, ramuli usually 4-sided. Leaves succulent, opposite, entire. Stipules sheathing within the petiol, often bedewed with a yellow resinous exudation. Cymes terminal, trichotomous; flowers large, white.

This is a large genus, for this order, as it includes 20 species. It is not one with which I am well acquainted, having only seen three species. A careful examination of these has, however, enabled me to introduce one or two slight corrections into De Candolle's character. In his character he calls the ovary two-celled, this I find is not the case in either of the two I have examined. In both it is, when examined at an earlier stage than is represented in the plate, 1-celled, the partial partitions from each side, not meeting in the centre, though they afterwards do so, but do not cohere. The tree here represented is not very unfrequent about Coonoor, but is not common. It is of low stature, of rather ungainly appearance, the leaves being all clustered, along with the large whitish flowers, on the ends of the youngest ramuli. The leaves themselves are much broader above, perfectly smooth on both sides, thick, fleshy and veinless, quite entire on the margin. The flowers are generally in threes, of a dull white, approaching to cream colour, with long projecting stamens. The seed are small, rough, somewhat kidney-shaped, attached by the middle, the embryo nearly the length of the seed, lying across the hilum, of nearly equal thickness throughout and enclosed in a copious fleshy albumen.

I have also met with this tree at Courtallum, at a considerably lower elevation than Coonoor. My other species is from Malabar; and Ceylon claims a third, all the others are stated to be natives of the Eastern Islands and Tenasserim Coast, one is found in Silhet.

... on the ends of
4–6 inches long
... and 3–5 broad near the apex, peduncles usually
3 from the end of the branch each with 3 large
white flowers. Corolla nearly 3 inches long, some-
thing between campanulate and wide infundibuli-
... Berry elliptical,
... about as much long, filled with fleshy pulp in which
... fleshy albu-
men: radicle superior.

the numerous minute seeds nidulate. Seeds small, nearly globose, testa rough, albumen copious, embryo axillary, terete, radicle superior.

Courtallum and Coonoor, Neilgherries, flowering during rainy season. A small, rather ungainly, stunt-

GARDNERIA.

Calyx small, 4–5-lobed, persistent, corolla rotate, 4–5-parted, throat naked, lobes ovate, leathery, valvate in æstivation, the margins thickened at the apex, stamens 4–5, alternate with the lobes, inserted on the throat; filaments short, oval-shaped; anthers erect, free, or somewhat coherent, free at the base and apex. Ovary free, ovoid, 2-celled; with one ovule in each; style filiform, shorter than the anthers. Berry globose, crowned by the persistent base of the style, 2-celled, with the seed attached to the middle of the membranaceous partition. Seed thin, orbicular, concave towards the axis, convex on the back; albumen horny, the shape of the seed. Embryo erect, cylindrical, radicle long, cotyledons lanceolate. Twining shrubs, branchlets 4-sided, afterwards round. Leaves opposite, entire, exstipulate; but the dilated base of the petiols grasping the branch. Cymes axillary, few-flowered; flowers pale-greenish coloured. Berry red or purplish, about the size of a pea.

This genus was established by Dr. Wallich for the reception of two Bengal plants. One a native of Nepaul, the other of Silhet, to which the accompanying has since been added from these Hills. It is frequent in the clumps of Jungle (Scholahs) about Pycarrah where it climbs to the tops of the highest trees, and then covers them with a rich canopy, forming most natural and shady arbours.

As a flower, it has little beauty to recommend it to notice, but is interesting as being, so far as I am aware, the only plant of the order, frequenting the higher range of these mountains. The foliage is exceedingly deep green, the leaves rather thick or somewhat fleshy, very smooth and quite entire. I do not know of any active property residing in this plant, but judging from the family to which it belongs, it seems not improbable, that it is not quite innocent of such.

1313. Gardneria Wallichii (R. W. in Wall. pl. as. rar. 3 tab. 281), glabrous, voluble: leaves oval acuminate at both ends, acute: cymes axillary, pedunculed, much shorter than the leaves: flowers tetrandrous: berry globose.

Frequent on the Neilgherries, flowering March and April.

It is an extensive climber, ascending to the tops of the highest trees, and then covering them with its numerous branches and very dark green foliage. Flowers of a dull yellowish colour.

GENTIANACEÆ.

It was remarked of the preceding family that it was so peculiarly tropical in its predilections, that a few species only were found in temperate regions. The reverse is the case here, by far the greater portion of this large and beautiful family being composed of extra tropical plants, not a few of which reach nearly to the line of perpetual congelation, while a few only are found within the tropics. This will account for their frequency on the Neilgherries, where they form a marked feature of the flora, both as regards the number and beauty of the species. For the elucidation of this order, I have selected five species referable to 4 genera, all conspicuous for their beauty, and which, it appears to me, might all be with advantage introduced into the flower garden where, under proper culture, their native beauties would be heightened.

The family is divided into two tribes or, more properly, sub-orders, the plants of each being so unlike, both in habits and appearance, that they might without violence constitute distinct orders. To the first, *Gentianeæ*, all the Hill species belong: to the second, *Menyantheæ*, a series of aquatic plants, many of them floating, are referred. But though thus distinct in external features they accord in points of structure esteemed of greater importance in the limitation of affinities.

The Hill ones are generally easily recognized by their erect form, 4-sided stems and branches, opposite, entire, smooth leaves, and terminal corymbs, of generally more or less decidedly blue flowers. The little Gentian is the only exception, it being procumbent. They belong to the corolliflorous class, which has monopetalous inferior flowers, with the

stamens inserted on the tube of the corolla. The stamens are either 4 or 5, the filaments sometimes, though rarely, dilated and cohering at the base. The ovary is one-celled with parietal placentas. In the genus *Exacum* the margins of the 2 valves, of which the ovary and capsule is composed, are inflexed and somewhat free within the cell of the ovary, but more commonly they meet and coalesce, forming a parietal placenta, as shown in *Gentiana*. In *Halenia*, on the other hand, they enlarge at the point of junction, forming a thick fleshy mass, filling the whole of the centre of the cell and bearing two rows of seed on each side. This part of the structure is unfortunately very badly brought out in the accompanying plate, but is well shown in one subsequently prepared for my Illustrations of Indian Botany. And, lastly, in *Ophelia* there are 4 parietal placentæ, a very unusual structure in the family, but which may be accounted for on the supposition of their being sub-marginal, that is, the ovuliferous margins, in place of being so deeply inflexed as to become loose like those of *Exacum*, are simply folded in and adhere to the face of the valves, thus forming two placentas on each. This peculiarity seems not to have been noticed by writers on this family; Grisebach indeed describes the ovules as inserted on the suture, which is not quite correct.

As already mentioned, this family has a very wide geographical range, its species extending from either polar circle to the equator, thus at the same time luxuriating within a few feet of perpetual congelation and on the most arid plains of the tropics. But while this is true to the letter, we must not overlook the fact that, of those found within the tropics, the majority inhabit the cool mountain tops, a few only occurring on the plains, and most of these only arriving at maturity during the cooler seasons of the year.

As regards properties, bitterness is the distinguishing characteristic of the family, hence many of them are highly esteemed as tonics and restoratives in domestic medicine, and several are in daily use for the same purpose in medical practice, the root of the officinal gentian *(G. lutea)* being among the most esteemed.

In regard to the plant here named, *Halenia Perrottetii*, I may remark, that it is not that species but apparently a variety of *H. elliptica*—a species also found in Nepaul. The true *H. Perrottetii* has longish, ovate acute leaves, not short elliptic, obtuse ones, as in the plant I have erroneously so called. They are very nearly allied, if really distinct.

EXACUM.

Calyx 4–5 parted, segments keeled or winged on the back. Corolla rotate, withering, tube becoming globose, limb 4–5-parted. Stamens 4–5, inserted on the throat; anthers remaining unchanged, opening by a pore-like slit, at the apex. Ovary spuriously 2-celled, the free inflexed margins bearing the ovules; style distinct, declinate, deciduous; stigma capitate, undivided, or with a slight transverse furrow. Capsule spuriously 2-celled, dehiscing between the inflexed margins (septicidal) which sometimes adhere in the centre, sometimes remain distinct, seed minute, immersed in the placenta. Usually annual, erect, straight, herbs, very smooth, with terminal cymes; flowers usually blue, but sometimes nearly white.

The species of this genus are for the most part beautiful flowering plants, the flower, of all I know, except *E. bicolor*, are some shade of, often deep, blue. Grisebach in his generic character describes the ovary as 2-celled, with the ovules attached on both sides to the central suture. This part of his character I have altered as not being quite consonant with fact. The real structure is not well shown in either of the plates, but when carefully examined, there is no difficulty in discovering that they do not cohere in the centre, though they meet, the placentiferous margins being covered with ovules which touch, but not the placenta. This is well shown in my Illustrations, the dissections of which were executed with more care, after I had received his monograph, which I had not seen, when the drawings for the accompanying plates were made.

The genus is one of considerable magnitude, containing, according to Grisebach, 22 species, all natives of India and the Indian Islands. Here they occupy a wide range, as regards elevation and temperature, some being natives of the plains, almost on the sea level, while others, and the more conspicuous ones, occupy the highest mountain ranges of both the Peninsula and Ceylon. The two species figured here are from about Coonoor and Nedawuttim. I am uncertain whether they would bear the colder climate of Ootacamund, but if they were found to do so, I would esteem them desirable additions to the flower garden.

The species of this genus are sometimes of difficult discrimination, so much so, that I do not feel quite certain, whether I ought not to view the plant here figured, under the name of *E. Perrottetii*, as a tetandrous variety of *E. Wightianum*, which is also not unfrequent on the Hills. It is quite possible, I may not have got the true plant, as there are some discrepancies between my plant and Grisebach's character. According to his character, there is *some* difference between the form of the lobes of the corolla, and those shown in the figure, and, as I understand, the anthers are more elongated than in my plant. The other, *E. bicolor*, accurately corresponds with Roxburgh's description, though he obtained his plants from Cuttack. It abounds among long grass, on the slopes about a mile below Nedawuttim.

EXACUM PERROTTETII (Griseb.), stem straight, 4-angled, simplish: leaves sessile, oblong, lanceolate, acuminate, 5-nerved with smooth margins: calyx deeply 4-cleft, segments subulate with semi-lanceolate wings: corolla rose-coloured or blue, lobes obovato-elliptic cuspidate, 4 times longer than the tube. Griseb. l. c.

Neilgherries, Coonoor, Kaitie Falls, &c., frequent. Stem erect, about two feet high, simple below the cymes and cymules from the upper axils: internodes shorter than the leaves: pedicels about an inch long with a small bract, corolla about 1¼ inch in diameter: anthers like those of E. Zelanicum: capsule erect, ovoid-globose.

EXACUM BICOLOR (Roxb.), stem 4-angled: leaves sessile, ovate, subacute, 5-nerved with smooth margins: calyx deeply 4-cleft, segments subulate with ovato-lanceolate wings: corolla white, tipped with blue; lobes elliptic, oblong, cuspidate, three times longer than the tube, which is is a little shorter than the calyx.—Corolla large, nearly two inches in diameter, cymes terminal sub-contracted: middle internodes usually shorter than the leaves. Griseb. in D. C. Prod.

Neilgherries, below Kotergherry, rare; in pastures about a mile below Nedawuttim abundant, flowering during the autumnal months.

GENTIANA.

Calyx 4–5 parted, or cleft, valvate in æstivation. Corolla marcescent (withering on the stalk), funnel-shaped, or salver-shaped, naked or furnished with a crown; limb 4–5-parted, or, counting the folds, spuriously 10-cleft. Stamens 4–5, inserted on the tube of the corolla; anthers incumbent, or erect; sometimes united into a tube, opening externally. Ovary, sometimes bound with a spurious, interrupted disk, 1-celled, ovules near the sutures; stigma 2, terminal, revolute or, if contiguous, funnel-shaped; style none, or with the stigma, persitent. Capsule 2-valved, septicidal, 1-celled; placentæ membranaceous, inserted along the edge of the sutures. Seed immersed in the placentæ.—Herbaceous perennials of various habit, erect, or procumbent, with raceme-like cymes, or terminal flowers.

Of this very extensive genus, including nearly 160 species, only one is found on the Neilgherries, and that one enjoys a very extended geographical range. Wallich and Royle have it from the Himalayas, Kunawar and Nepaul, and I have gathered it on the Neilgherries, Pulneys, and Neuera Ellia in Ceylon. This order, as stated above, is remarkable for the extent of its geographical range, and some of the species of this genus exhibit this property of diffusion in the most remarkable degree. The following extract from Hooker's Antarctic Flora presents, I believe, one of the most remarkable examples of the kind yet known in the vegetable kingdom. "One species, *G. prostrata*, has a most extraordinary range, both in longitude and latitude; in Southern Europe it inhabits the Corinthian Alps, between 6000 and 9000 feet high; in Asia it has been found on the Alti Mountains about N. latitude 52. Its American range is much more remarkable, it having been gathered on the tops of the Rocky Mountains in lat. 52 N., where they attain an elevation of 15,000 to 16,000 feet, and on the east side of the Andes of South America in 35 south; it descends to the level of the sea at Cape Negro; in the Straits of Magellan in lat. 53 S., and at Cape Good Hope, in Rherings Straits in lat. 68½ N."

This is the only Indian species of this large genus, so far as yet known, which extends so far south. As seen nestling among the herbage on the Neilgherries, on the grassy pastures of almost every part of which, above 6000 feet of elevation, it occurs, it is a beautiful object, expanding its small, but bright blue flowers during sunshine, nearly all the year round. Though generally a favourite, with those fond of flowers, but few if any attempts have been made to improve it by cultivation, and in its natural state it seems too common and inconspicuous an object to attract much attention, or lead to its introduction into gardens. I cannot, however, divest myself of the opinion, that with care it might be much improved, as regards the size of the flowers, and nothing can be richer than the deep blue of the corolla.

GENTIANA PENICELLATA (Wall.), stem loosely ramous, glabrous: leaves elliptico-lanceolate, the broader ones aristate at the apex, smooth on the margins, the lowest ones rosulate: flowers pedicelled: calyx campanulate 5-cleft, lobes ovate cuspidate, recurved at the apex, shorter than the clavate tube of the corolla: corolla blue, the tube furnished with 5 projecting, triangular, acutely mucronate lobes: plicæ emarginate: capsule obovate, rounded at the apex.

Neilgherries, frequent in pastures flowering at all seasons. The bright blue flowers render this a conspicuous plant even though the foliage can scarcely be distinguished from the surrounding herbage. It seems to have a wide geographical range, extending on alpine ranges from the Himalayas to Ceylon. I have now gathered it on the Neilgherries, Pulney Mountains and Nenera Ellia in Ceylon. I think it is also found on the higher hills in Coorg and Mysore.

OPHELIA.

Calyx 4–5-parted, segments united at the base, valvate. Corolla marcescent (withering on the stalk) rotate 4–5-parted, destitute of folds or crown; furnished with pits or glands above the base, either naked, or oftener covered with a fimbriated scale. Stamens 4–5, inserted on the throat of the short tube; filaments sometimes united at the base, monadelphous, sometimes equal and free; anthers incumbent, nodding or erect, often greenish. Ovary one-celled; ovules numerous, inserted on the sutures; stigmas two, short, often revolute; style wanting or short. Capsule 2-valved, one-celled, spliting along the suture); placentas either spongy, sutural, or expansions on either side, near the suture. Seed immersed in the placentas, very small, wingless. Herbaceous annuals or perennials, erect, ramous, panicled. Leaves opposite, terminal, cymes umbel-like.

To this genus Grisebach assigns 18 species, but several have since been added. Of these eighteen, 16 are natives of India, one is from China, and one from Australia. The genus was first separated from *Swertia* by Don, on the ground of its having rough angular scrobiculate seed, those of Swertia being compressed and more or less winged. Grisebach has in his characters of the genera suppressed these (Don's) distinguishing marks, whether correctly or not, I am unable to say, but so far as I am able to make out from a comparison of his own written characters, there is actually no difference between the two genera; and, even supposing Don's distinctions constant, I am scarcely prepared to accord to them generic value, in opposition to identity of habit and structure in every other part of the plant. Could geographical distribution have been adduced in aid of the distinctions taken from the seed, that is, had the European forms all had compressed margined seed and the Asiatic and Australian ones, globose or angular ones, the case would have been different, but as the case now stands, it seems a case of distinction without a difference. Being however unwilling to create additional confusion, I have preferred retaining the genus as constituted by Grisebach, simply because all the Neilgherry ones are referred to it, thereby, so far as our flora is concerned, removing all difficulty.

In its geographical distribution, all the Indian species inhabit elevated mountain ranges, and flower during the coolest season of the year. Those of the Neilgherries grow on the grassy slopes and about the outskirts of woods, generally on moist soils and mostly flower during the rainy season. Of course they are met with at other times, but attain their greatest perfection during the autumnal months. Like the rest of the family they are bitter, and doubtless might, like the true gentians, be used as tonics. I am not aware of any having been so employed, but that they might be I feel pretty certain.* Several of them are plants of great beauty, and seem to merit on the part of horticulturists more attention than they have yet received. Were they only procurable from Europe, they would be prized, and I think it pro-

* Since this was written I learn from Walter Elliot, Esq. of one at least being used in the Northern Circars as a substitute for Creyat (Justicia paniculata).

bable, if persons on the Hills were to collect seed and send them to England, they would soon be taken notice of there. In addition to the one represented here, there are three or four others, natives of the Hills, all pretty, though not so conspicuous as the *Exacum*. They have the advantage of continuing in flower a long time through the successive opening of fresh portions.

I remarked, rather inconsiderately, I fear, in my Illustrations, that this genus seemed to have a four-carpelled ovary; subsequent consideration and more recent examination have led me to conclude that that was an erroneous view of the structure, and that this genus does not differ from the rest of the order in the structure of its ovary.

Ophelia corymbosa (Griseb.), stem 4-sided, ascending, branches divaricate: leaves spathulato-elliptic, roughish, 3-nerved; the lower ones largest, the stem ones short sessile: cymes sub-fastigiate, few-flowered, pedicels spreading, segments of the calyx linear acuminate, half the length of the corolla: corolla 4-parted, blue, segments obovato-elliptic, mucronate: fovea minute, orbicular, solitary, covered with a scale, fimbriate at the apex, and themselves bound with short fimbriæ: filaments linear.

Neilgherries, not unfrequent during the rainy season in pastures and about the outskirts of woods. The lower branches of this are not fastigiate, but often nearly horizontal, the flowers only looking to the sky, in which respect it differs considerably from another which Grisebach has joined with it.

HALENIA.

Calyx 4–5-parted, lobes united at the base, valvate. Corolla withering, shortly campanulate, 4–5-cleft; lobes erect, destitute of folds or fimbriæ; the glandulifeous pits prolonged into spurs! Stamens 4–5, inserted on the throat of the corolla; filaments equal at the base; anthers small, incumbent. Ovary spuriously 2-celled, from the thickened spongy placentæ meeting in the centre; ovules numerous, superposed, inserted on the inflexed margins of the valves; stigmas two, sessile, or with a shortish style, often connate and confluent with the ovary. Capsule 2-valved, septicidal placentas sutural. Seed immersed in the placentæ, globose; embryo superior, minute; albumen copious. Herbaceous annuals or perennials, erect, ramous; cymes terminal, umbelliform; flowers usually yellowish or tinged with blue; corolla about twice the length of the calyx.

I have altered the character as regards the ovary to make it correspond with the two Neilgherry species. I may here remark that the figure of the ovary, as given in the accompanying plate, is not quite correct. A better representation is given in my Illustrations of Indian Botany, where the true *H. Perrottetii* is figured. The drawing from which this plate is taken was not made under my eye, and the section of the ovary does not clearly exhibit its structure and the position of the ovules, a circumstance which I now greatly regret not having detected before sending the drawing to the Lithographer. This is not the true *H. Perrottetii* but either a very distinct variety or *H. elliptica*, only hitherto known from the Himalayas. I now call it *H. elliptica*.

The species of the genus *Halenia* are for the most part natives of the alpine regions of Northern Asia, and America, but some are found in Mexico and the Andes of Peru. This, and its congener are the only ones found in Southern India. I have not seen Ceylon specimens and do not know whether it occurs there. I found it on the Pulney Mountains. It presents a considerable variety of forms. I have specimens with distinctly petioled leaves and others which correspond in form with the one here represented, but scarcely exceeding 6 inches in height. The acute leaved *H. Perrottetii* is sometimes found, in moist shady forests, from 4 to 6 feet high.

The genus is a curious one on account of the remarkable spurs of the corolla. Linnæus originally referred it to *Swertia*, calling the only one he knew *Swertia corniculata*, in allusion to the horns or spurs of the corolla. The flowers, though far from conspicuous, are rather pretty from the interblending of blue and red with the yellowish ground colour of the corolla, points not well brought out in the plate.

Halenia Perrottetii (Griseb.), stem erect, ramous: leaves ovato-lanceolate acute, 5-nerved, subsessile: pedicels axillary and terminal, unequal, filiform: segments of the calyx lanceolate, acute: spurs thickish, half the length of the corolla, corniculato-obtuse, spreading and ascending at the point: corolla pale blue: lobes ovate mucronate, stigmas small, distinct at the apex.

Pulney and Neilgherry Mountains, common among long grass and about the outskirts of woods in both places.

This plant often attains a considerable size, two or three feet high, and very ramous, becoming altogether a large annual. The specimen figured was selected on account of its small size, as better suiting the space allowed in these plates.

OROBANCHACEÆ.

This is a curious order of parasitic plants, growing on the roots of others, just as Loranths grow on the branches. Though thus corresponding in the peculiar property or power of appropriating to their own nourishment, the juices of other plants, these two families are as widely distinct, in all other respects, as are their respective stations on the plant that fosters them.

The Loranths are woody plants, with green leaves; the Orobanchs have soft herbaceous stems, and, for the most part, brownish white, or yellowish leaves, or rather scales, for they never acquire the development of leaves; in both families there is a tendency to the accumulation of a mass of vegetable matter, just above the union with the supporting plant, as indicated by the large woody masses, occasionally observed on the branches of trees, at the point of union between the parasite and stock. In like manner when Orobanchs are dug up along with their nourishing plant, it is very often found that the supporting root, is not much thicker than a pack-thread, while the base of the attached parasite is as large as a man's fist or larger, with several shoots springing from its surface.

This family, as regards the structure of its ovary, and botanical relations, has given rise to much difference of opinion, Mr. Brown and, I believe, most Botanists, being of opinion that it is strictly in accordance with that of other dicarpellary families, in bearing the placentas on the margins of the carpels, and opening along the middle of the valves, while Dr. Lindley advances the opinion, that the placentas do not appertain to the margins, but spring from the middle of the valves, the line of dehiscence being along the margins. The discussion, in a purely botanical point of view, is a very interesting one, and has been fully entered into in my Illustrations of Indian Botany, but does not seem to me to require being gone into here, beyond simply remarking that for myself I adopt Mr. Brown's views, and in accordance with them, place this order between *Gentianaceæ* and *Cyrtandraceæ*, as agreeing in the structure of the seed with the former, and in the ovary and flowers with the latter. With *Scrophulariaceæ* it also corresponds in the structure of the seed, but differs in that of the ovary. In practice it is easily recognized by its habit, as being made up of "herbaceous, leafless plants, growing parasitically on the roots of other species, having the stems covered with brown or colourless scales." Characters taken from the flowers are variable. Some, as for example that shown in the accompanying plate, have a perfect calyx and corolla, but in others the calyx is obsolete or wanting. The corolla is generally irregular, personate. The stamens are didynamous, usually within the tube, but the anthers vary, being sometimes all perfect, consisting of 2 parallel polleniferous cells, in others, as the accompanying species, one of the cells of each anther is imperfect, and, in place of containing pollen, is reduced to the form of a long pointed spur, while in others it is altogether wanting. The ovary is superior, but, as seen in a cross section, presents considerable differences. For the purpose of ascertaining these differences, the best method of proceeding is, to allow the flower to wither or even become quite dry, but without pressure, by which the thick spongy placenta becomes shrivelled. If it be then moistened, so as to become so soft and pliable as to cut without crumbling, the structure is very easily made out. This plan was unfortunately not practised when preparing the accompanying drawing, which therefore does not show the structure, so well as it might have been exhibited. In this genus the inflexed placentiferous margins of the valves

become revolute, and when deprived by partial drying of their moisture, become so shrunk as to give the appearance of being loose in the cells of the ovary.

In its geographical distribution, this family has a wide range, Europe, Asia, Africa, America, and Australia all have their species, but though thus widely distributed, their aggregate number is not great, amounting only to about 120. The number hitherto recorded, of Indian origin, is small, but will, I suspect, as we become better acquainted with their discriminating characters, be greatly enlarged. In the Indian Peninsula, they most abound in alpine regions under the influence of the south-west monsoon, and where they do occur, greatly abound. The one here figured was found among the grass on the sides of the road leading from Pycarrah down the Goodaloor Pass, rather sparingly, but most abundant in the jungles about Mr. Fowler's Coffee plantations. Other species occur in the "Sholahs" or clumps of jungle on the left of the road leading to Pycarrah, flowering most profusely during the prevalence of the monsoon. The large rich blue-flowered species (*Œgenetia pedunculata*) which abounds on the hills at the head of the Bolampully Valley near Coimbatore, and on the Anamullies, I have never met with on the Hills. The *Orobanche*, so common in the Tobacco fields on the plains, seems only to grow on that plant, and, judging from the accounts given of it, its seed would appear to lie for years in the ground quite inert until Tobacco is planted, when it is almost sure to make its appearance on the roots, and doubtless would be productive of vast injury to the crops, but for the rapidity of growth of the foster plant which has for the most part nearly attained a state approaching to maturity before the parasite has had time to do it much injury. Curiously enough, the Natives have an idea that it is a spontaneous production, not propagated by seed, and take no steps for its eradication, which might be easily accomplished by destroying it as fast as it appears above ground, before it has had time to mature its seed. These are produced in such abundance that once, on examining under the microscope a very small quantity of soil, I picked out nearly a dozen of these minute seed; at which rate, a single handful of the earth of the field from which it was taken must have contained, probably, several hundreds. Thus abundant, it is fortunate it only attaches itself to one plant, the Tobacco; did it attack all, promiscuously, the injury would be incalculable. But that it does not attack others is proved by the fact of its never being seen in any but Tobacco fields, whence its native name, "Tobacco fungus." The Cholum or Jowari, and other crops which are sown in succession, altogether escape.

The fact of the seed lying dormant, sometimes for years, between the planting of two Tobacco crops, is curious, and merits, on the part of those who devote themselves to such inquiries, special investigation, as affording a confirmation of a theory which has at different times been taken up and as often cast aside as being deficient in proof. The theory to which I allude is that which attributed the necessity for rotation in Agriculture, to the crop poisoning the soil and disqualifying it for producing a succession of crops of the same species. This theory, which had its run, was soon cast aside as untenable, the true cause, it is now said, being the exhaustion of those particular ingredients on which the various crops respectively feed and which a succession of crops of the same species, so completely removes as at length to cause the starvation of new ones. This latter theory is in the main the more feasible of the two, but the case under consideration seems to render it more probable that both contribute to the result. It appears from the fact stated, that of this Orobanch only appearing in Tobacco fields, that its seed lie dormant

in the intervals between two crops, and hence, that the Tobacco plant must yield some secretion fitted to stimulate into active operation the latent vitality of the seed. This deduction is so self-evident that it seems unnecessary to insist further on it, beyond merely remarking, *en passant*, that if the stimulating properties of the secretions of one plant are necessary towards exciting vegetation in the seed of another, there seems no very obvious reason why they should not prove injurious to successive crops of itself, or one of the same genus or even order. At all events, it is a well known fact that natural forests when, from whatever cause, destroyed, are almost invariably replaced by plants belonging to widely different families.

CHRISTISONIA.

Calyx tubular, quinquifid, equal or sublabiate. Corolla hypogynous, tube funnel-shaped, limb 5-lobed, bilabiate. Stamens didynamous, inserted on the tube of the corolla, all fertile, incluse, or rarely exserted; anthers 2-celled, one polleniferous, dehiscing at the apex by an oblique pore, the other sterile, prolonged into an acute spur. Disk none. Ovary ovate, oblong, 1-celled: placentiferous margins deeply inflexed, revolute within the cell; ovules numerous. Style filiform, simple; stigma bilabiate, or orbicular. Capsule enclosed in the calyx, sub-globose, 1-celled, 2-valved, dehiscing loculicidally, and bearing the placenta on the middle of the valves. Seed numerous, oblong, obtuse, supported on a short thick funiculus; outer seed-coat loose, membranaceous, reticulated, or sub-scrobiculate (pitted like a thimble). Embryo enclosed in copious albumen, orthotropous. Cotyledons short, obtuse: radicle thick, blunt. Herbaceous plants growing parasitically on the roots of other plants. Stems short, simple or ramous, scaly below, floriferous towards the apex; flowers large, rose-coloured, or yellow, or deep purplish blue; pedicels racemose. The following essential character of the tribe and genus is copied from my Illustrations of Indian Botany.

Hyobanchex. Ovary imperfectly 2-celled, that is, the inflexed carpels only partially meet in the axis; while the placentiferous margins, remaining free and spreading to the right and left, form two broad lamellar placentæ.

Christisonia. Calyx tubular, 5-toothed. Corolla infundibuliform, sub-bilabiate. Anthers 2-celled, one sterile, subulate. Placentæ free, revolute.

We are indebted to the researches of the late Mr. Gardner of Ceylon, for the separation of this genus from *Phelipæa* with which the few species, previously known to Botanists, had been combined.

When he defined the genus and published it in the 8th volume of the Calcutta Journal of Natural History, he was of opinion that it belonged to the natural order *Cyrtandraceæ*, with which it certainly accords in many respects, and accordingly indicated that as its proper place in the natural system. Subsequent consideration and a more intimate acquaintance with *Orobanchaceæ* led him to coincide with me in thinking it better located in the latter, with which it accords in both habit and structure. It in truth goes far to combine three large natural orders, *Gesneraceæ*, *Orobanchaceæ*, and *Scrophulariaceæ*, to either of which, with the exception of habit, it might be referred.

The species, so far as yet known, are few, about 10, but I feel certain that many others will yet be found. One species, as already mentioned, is abundant on the north-western slopes of the Neilgherries. I have not met with it elsewhere. It comes very near Gardner's *C. bicolor*, if indeed it be not that very species, from which, on recomparison of the drawing with the character, I find it mainly differs in the position or rather direction of the sterile cells of the anther, in mine horizontal, in his erect; a distinction scarcely of specific value. The stigma also seems to differ, but I fear more in words than substance.

He views the stigma as 2-lobed, but with one of the lobes frequently aborting, which I do not think the case; but taking that view, he describes the stigma of his *C. bicolor* as "2-lobed, the upper lobe abortive, the lower flattened, somewhat triangular, emarginate," a character which does not accord with that shown in the plate, which is peltate, umbilicate, somewhat 2-lobed; the lobes slightly emarginate. Not-

withstanding these discrepancies, I am still disposed to fear that I have erred in overlooking the many points of agreement when naming this species, which however may yet, on comparison, be found distinct.

It is to be regretted that plants so curious, and at the same time so exceedingly beautiful, as many of them are, cannot be cultivated, owing to their peculiar mode of nutrition. Many of the tropical *Orobanchea* are, as regards the flowers, plants of great beauty. The *Christisonias* are in this respect especially deserving of notice, the colours of their flowers being to the full as deep and bright as those of the deservedly much-prized *Torenia asiatica*, and could they only be cultivated, would doubtless become esteemed articles for prize competition. This, however, in the present imperfect state of our knowledge of their habits, seems next to an impossibility, but still as skill and perseverance have before often overcome apparent impossibilities, success, even in such an unpromising case as this, might be found to crown the attempt. I would therefore suggest for the consideration of the present skilful superintendent of the Ootacamund gardens, that he turn his attention to the subject, and having ascertained what plants they select as foster parents, introduce them and then sow the seed of Orobanche among their roots. I can recollect when Orchids were considered the opprobrium of floriculture, and now every amateur cultivates them successfully; might not the same happen in the case of the more showy of the Orobanchs. Loranthea are easily propagated, all that is required being to stick, by means of its own viscin, a seed on the branch of a tree and there it takes root. The same may be the case with other parasites and thereby add a new feature to our hothouses.

CHRISTISONIA AURANTIACA (R. W.), erect, sparingly scaly, pilose: scales ovate, appressed, glabrous: flowers corymbose, long peduncled: peduncles bibracteolate near the middle: calyx tubular, pilose, 5-toothed, teeth mucronate: corolla tubular, externally pilose; limb about equally 5-lobed; lobes rounded, spreading: stamens didynamous; sterile cell of the anthers subulate, about twice the length of the fertile one, style exceeding the stamens, exserted, bent at the apex, stigma large, hairy, umbilicate.

Neilgherries, among long grass by the road side leading from Nedawuttim to Goodaloor, also very abundant in the dense jungles surrounding Mr. Ouchterlony's Coffee plantations.

In the former station it occurs in patches of a few plants, but in the latter in masses, covering several square feet. I could not make out the plant on which it grew, or rather I should say it does not limit itself to one species. It rises to the height of 6 or 8 inches, the stems, bracts and bracteols of a dull brownish yellow, the calyx deep reddish orange, tube of the corolla dark yellow, limb bright yellow within. Altogether it is a very conspicuous plant and one which I have not before met with.

CYRTANDRACEÆ.

This is not properly a distinct order—although until recently it has always been viewed as such, and separately described in botanical works—but forms a section or sub-order of *Gesneraceæ*, a much older and better known family. That order is divided into two sub-orders, *Gesnereæ* and *Cyrtandreæ*, the former being almost exclusively of American origin, the latter Asiatic. It is on this latter account, added to the circumstance of this sub-order having hitherto been always treated separately, that I keep up the name here, in preference to adopting the older but, as regards Indian botany, less known name.

The plants composing this family are generally of considerable beauty, and in England many of them are cultivated, and most deservedly prized on that account. The one here given may be looked upon as a fair specimen of our Indian forms. They usually occur growing on moist rocks or in clefts of rocks which have become so far filled with vegetable soil, as to afford accommodation for their roots and ample moisture from the water trickling from above. I have occasionally met with patches of rock moistened by adjacent springs several square yards in extent, completely covered by the spreading leaves of numerous plants, from the centre of each of which rose one or more peduncles bearing a terminal cluster of flowers, similar to those here represented, and forming together a most gorgeous flower plot, such as, in an English garden, would attract universal attention and

doubtless some degree of envy. In addition to these stemless forms, the Neilgherries furnish another genus (*Æschynanthus*) belonging to this family of scandent epiphetical plants, they are shrubby and cling to trees by little side roots like ivy, when in perfection produce abundance of tubular scarlet flowers which are very handsome. In gardens having old trees on which to train them, I should think they would well repay the trouble of culture and training.

It is not easy to assign any external marks by which this family may be distinguished from *Scrophulariaceæ*, an order agreeing in having similarly irregular flowers, didynamous stamens, superior ovary, and in the predominance of herbaceous habit. The Botanist accustomed to minute investigations can, for the most part, easily distinguish them by merely examining a section of the ovary or young capsule, which, in *Scrophulariaceæ*, is 2-celled with the ovules in the centre, while in this it is one-celled, with the ovules on processes, more or less elevated, projecting from the sides, or, in the language of the science, on the inflexed margins of the carpels, meaning thereby that the capsule is composed of 2 leaves, modified to adapt them for that particular purpose, which are placed face to face with the margins turned in and somewhat thickened to form the placenta on which the ovules and seed are borne. This structure is clearly exhibited in two transverse sections in the plate; one shows the ovary and ovules, the other the capsule after it has burst and shed the seed. A similar structure exists, though less clearly shown in the Orobanchs. A reference to *Scrophulariaceæ* will at once show the difference. The seed supplies another distinction, but on account of their small size not easily made out, and unfortunately not shown in the figure of *Didymocarpus*. In this sub-order, when the shell of the seed is removed, the 2 two seed-lobes come into view, that is, they are not enclosed in albumen, while in *Scrophulariaceæ* the bulk of the seed is made up of that substance, as shown in the figure of *Pedicularis*. This is often a most important distinction but less so in the order *Gesneraceæ* than some others, the seed in many of the genera having albumen, while in others, as for example, the whole tribe of *Cyrtandreæ*, it is wanting. The seed of *Æschynanthus* are peculiar, in so far as they are supported on a long very slender thread or podasperm, and are terminated by one or more similar prolongations from the apex. The capsules are also unusual in their great length and mode of opening; and in one genus, *Streptocarpus*, in being twisted like a piece of tape spirally rolled round a stick. Another genus, *Epithema*, which I found far up the ravine at Burlear, is even more curious. It has two large placentæ rising from the base of the capsule, each bearing on the apex, numerous pedicelled oval spirally-twisted seed. In *Jerdonia*, the ovary differs from all the rest of the order, in having 4 parietal placentæ. Figures of all these forms are given in my Illustrations. So far as I have seen, the plants of this order are generally alpine, preferring localities exposed to the influence of the south-west monsoon, where they enjoy during their flowering season a moist climate, as well as abundance of moisture about their roots. *Æschynanthus* is the only exception to the latter selection, for it seeks the support of trees, but there too, it enjoys the benefit of moisture to the roots, through the medium of what is retained in the rough bark to which it clings. *Cyrtandraceæ* are numerous in Ceylon, and the Eastern Islands, also in Assam. In the Peninsula they are less frequent.

I am not aware of any use to which any of the species are applied, but many of them are esteemed as ornaments in the stove and conservatory.

DIDYMOCARPUS.

Calyx 5-cleft or 5-parted. Corolla funnel-shaped, or sub-campanulate; limb 5-lobed, somewhat irregular, rarely 2-lipped. Stamens 4, of which 2, rarely 4, are antheriferous; anthers reniform. Ovary elongated; style short; stigma orbicular, undivided, often oblique. Capsule siliqueform, 2-valved; valves introflexed; seeds naked, pendulous, smooth. Under shrubs or herbs; caulescent or stemless. Leaves radical or cauline, alternate or often opposite, unequal. Peduncles axillary, ramous, or dichotomously cymose. Flower blue, red, or violet-coloured, or white. The limb is often deeply coloured while the tube is nearly colourless.

Of this very pretty genus De Candolle defines 24 species, but very many more remain to be admitted into our botanical catalogues. Judging from what I possess, contributed by the late Mr. Griffith from his Khassya and Malacca collections, it is my impression that the next revision of the genus will at least double the number. In the Indian Peninsula, so far as I have myself seen, the number is small, four or five, but I have not had opportunities of examining those parts where they are most likely to abound, namely, the Western Ghauts. All that I have found belong to the acauline section, the Malacca and Khasyan ones are principally referable to the cauline. The Ceylon ones, described by the late Mr. Gardner, are acauline and very like the Continental ones; one has procumbent branches.

The specimen, from which the drawing here given was taken, I found on moist rocks near the bottom of the water fall at Kartairy, flowering in February. I have since had numerous specimens brought to me from the hills near Coimbatore; and I saw it in great abundance on the Anamullies in August, but all past flower, though in other respects most luxuriant. I am unable to say how far it may be possible to cultivate a plant requiring a climate and soil so peculiar, but if it can be done successfully, it is well deserving of that distinction. Some of its congeners are established favourites in England where they succeed well in hothouses.

DIDYMOCARPUS TOMENTOSA (R. W.), leaves obovato-spathulate, doubly crenate, reticulately dull whitish tomentose above, densely ferrugineo-tomentose or woolly beneath: scapes erect, dichotomously cymose, many-flowered, hairy above: calyx 5-cleft, lobes linear obtuse, clothed with glandular hairs: corolla sub-campanulate, 5-cleft, lobes suborbicular: fertile stamens shorter than the tube: ovary about the length of the calyx: stigma dilated: capsule cylindrical, about 1½ inch long, pointed, hairy, splitting along one side only.—Flowers bluish purple.

Alpine situations, forming dense patches in moist clefts of rocks, &c. The specimen figured was gathered at Kattie Falls on the Neilgherries, in February. I have since received many specimens from hills near Coimbatore, and have often met with it in similar situations.

ACANTHACEÆ.

This is a large and interesting order, very abundant on these Hills. Among its species we find humble herbs, nestling among the grass, low growing under shrubs, extensive twiners, and large shrubs, but I never yet met with a species which could properly be said to aspire to the dignity of a tree. In its distribution it is equally varied; some we find inhabiting salt marshes within low-water mark, others on the plains and sands of the sea-shore on the level of the sea, and others occupying the tops of the highest mountains. Among the latter, we find large shrubs gifted with the curious habit of only flowering once in several years. But when they flower they do so in the greatest profusion. Several of the Neilgherry ones belong to that class, hence I was several years engaged in occasional explorations of the Flora of the Hills before I could make myself acquainted with some of those flowering at long intervals.

The order is a very natural one, so much so that, when a few species have become so well known as to be easily recognized, the rest are readily distinguished simply by habit or family likeness. In nearly all, the leaves are opposite, and the stems thickened

at the point of insertion; the flowers are spicate and each furnished with 3 bracts from the axil of which it springs. The exterior bracts are often large and foliaceous but sometimes reduced to a small size and ending in a subulate point; the flowers are always more or less irregular, the corolla being sometimes nearly regular but the stamens only two or four; in others the corolla is very irregular being ringent, or two-lipped, or one-lipped. The stamens vary in number and size, being two or four, frequently with the rudiment of a fifth which has aborted, showing that were the flowers regular they should have 5 stamens. The anthers, too, vary; they are sometimes normal, that is, the 2 cells are side by side, at others the two are separate, or one is imperfect and converted into a spur; occasionally, as in *Andrographis*, they are furnished with a tuft of hairs; but the most remarkable feature of the family is found in the seed-vessel which is composed of 2 valves, and within furnished with hooked processes to which the seed are attached. The valves open with elasticity (scattering the seed) through the middle of the partition which adheres to the valves, forming a ridge along the middle of each. The capsule is formed of 2 carpels, or modified leaves, the edges of which are inflexed and more or less perfectly meet in the centre, forming a 2-celled capsule, but sometimes there is a division between them. The dehiscence or mode of opening, therefore, of the capsule of this family, is what Botanists call "Loculicidal," or through the middle of cells, in contradistinction to "Septicidal," through the middle of the septum or partition, as is the case with many plurilocular capsules. By this mark their relationship to Bignoniaceæ is made out, many of the species of which have loculicidal dehiscence, but in others it is septicidal. This difference is made use of to divide that family into two principal divisions. When a nearly ripe capsule can be obtained there is no difficulty in determining the order of any Acanthaceous plant, as this kind of dehiscence is constant throughout the family. The seed is variable, sometimes smooth, sometimes rough, and hairy, generally flattened, but sometimes orbicular, but in all without albumen.

The order, as already stated, is a very large one, including, according to Nees' enumeration, 155 genera and about 1500 species. Sometime previous to the publication of Nees' monograph, Lindley gave 105 genera and 750? species as the probable numbers. The history of the order is curious. When first defined by Jussieu, in 1789, seven genera included all the then known species. To these Brown and Willdenow made several additions, but in 1830 they, according to Bartling, only amounted to 20. In 1832–33, Nees Von Esenbeck raised the number, appertaining to India alone, to 56. In 1840, Endlicher gave extended generic characters of 80. In 1847, Nees' monograph was published in De Candolle's Prodromus, and raised the number to 155 and about 1500 species. Since then considerable additions have been made to the species, and a few to the genera. Of genera, the number is excessive, many of those based on distinctions of scarcely generic value, and some on defective observation; the same may be said of some of the species, leading to the inference that the article was hurriedly finished, but notwithstanding these defects, the monograph is truly an excellent one, and worthy of the excellent Botanist who wrote it. Being a very difficult order, I have thought it advisable to illustrate it fully, and have, with that view, published in my Icones figures of about 100 species.

Its geographical distribution is extensive within the tropics, and the warmer regions on either side, Asia, Africa, and America all furnishing numerous species; Australia also contributes pretty liberally to the store, and even Europe is not altogether destitute, the genus Acanthus being found in Greece. With this marked predilection for heat it seems curious that they should so abound on the highest mountains. All the largest and finest

species seek alpine stations as their favourite places of growth, some even ascending as high as 7000 or 8000 feet on the Himalayas in lat. 30, north, and what seems still more remarkable, we find some species equally luxuriating on the plains, and at an elevation of nearly 6000 feet on the Neilgherries, and others spreading from Cape Comorin up to the banks of the Sutledge.

As regards uses, few of them are of much note, the Creyat, *Andrographis paniculata*, of India being one of the most valuable on account of its intense bitterness. But as ornamental plants, many of them are deserving of note and probably many would be more sought after, if they flowered at shorter intervals. The Thunbergias and cognate genera, being climbers with handsome flowers, are often met with in cultivation, and so are a few others, but certainly too few and too seldom, considering their ornamental capabilities.

MEYENIA.

Calyx small, 5-lobed, enclosed between two large bracteoles. Corolla funnel-shaped, throat large, tube short, closed within with a ring of hairs; limb nearly equal. Stamens 4, didynamous, anthers bearded at the apex, 2-celled; cells of the longer pair unequal, upper ones diverging, tomentose on the margin; of the lower ones parallel, about equal, both muticous at the base. Stigma membranaceous, dilated, bilabiately two-lobed. Capsule tumid at the base, above tapering to a point, 2-celled, 4-seeded, partition persistent, adhering to the axis of the woody valves. Seed globose, attached to spongy cup-shaped processes. Procumbent or twining under shrubs. Leaves opposite, entire: flowers axillary, pedunceled; limb of the corolla deep blue, tube brownish yellow.

This genus consists of a single species, which abounds on the eastern slopes of the Neilgherries, below Coonoor and Kotergherry. The plant when in perfection is one of great beauty, and well deserving of extensive culture. It is found to succeed well in the Calcutta Botanical garden, and I dare say might also thrive in Madras.

The figure of the upper pair of anthers, those in the right hand corner of the accompanying plate, is not good, it is incorrect as not properly showing the lower cell, which I now find extends downwards for some distance along the filament, and the short spur represented on the back view, I cannot discover in the dried specimen, though I fancy it is visible in the recent one, otherwise it would not be there. This is one of those cases, perhaps of too frequent occurrence, which proves that no confidence can be reposed in Native observation, however practised the observer, but I am occasionally obliged to repose it from the want of sufficient time to check every point of each plate before sending them to the press. The only other station I have found for this plant is the top of a high hill near Coimbatore, where I found it in great beauty covered with a profusion of flowers in May.

The essential characters by which this and *Hexacentris* are separated from Thunbergia seem rather slight; they are thus given by Nees.

Thunbergia. Fruit capsular. Corolla regular, all the anthers with a single arista at the base.

Meyenia. Fruit capsular. Corolla subregular. Anthers muticous at the base; cells of the longer anthers oblique.

Hexacentris. Fruit Capsular. Corolla regular. Upper anthers 1-calcarate at the base, the lower ones bicalcarate.

These characters seem scarcely of generic value, but they are greatly strengthened by the habit and general aspect of the plants themselves, when compared with each other.

MEYENIA HAWTAYNIANA (Nees), shrubby, procumbent, glabrous: leaves sessile, cordate, acute.

Frequent on the Eastern slopes of the Neilgherries, also on the tops of the Iyamallay Hills near Coimbatore.

The deep purplish blue of the limb of the corolla, and the numerous flowers which open at once, render this a very conspicuous plant and one well worth cultivation.

ENDOPOGON.

Calyx regular, 5-parted. Corolla, in the bud, often convolutely mucronate, bilabiate, throat inflated, upper lip broad bifid, within having a decurrent canal bearded on both sides for the reception of the style, lower lip trifid. Stamens two; cells of the anthers parallel, equal, muticous. Capsule 4-angled, sutures prominent, 2-celled, four-seeded near the base; partition adnate, narrow and incomplete above. Seed either depressed, lenticular, mucronulate with a shield-like depression on both sides near the hilum, or ovate, subcordate, carinate on one side, smooth. Shrubs with serrated leaves: flowers spicate; common bracts opposite, imbricated, broadish, the proper ones narrow. Corolla showy, blue.

This forms one of a group of genera the most perplexing I have ever tried to unravel; they are *Endopogon*, *Stenosiphonium*, *Strobilanthes*, and *Goldfussia*, all of which, so far as characters and habit are concerned, seem to form but one genus, and I can scarcely help thinking that unless better characters than those now assigned, can be found, they must either be united or ever remain a source of confusion and perplexity to the Botanist, as many of the species seem equally referable to any or all of them. While naming my series for publication in the Icones, I endeavoured to limit the three first within better defined boundaries, but fear I have only partially succeeded, and now regret that I admitted *E. Strobilanthes* into this genus, as its being didynamous in place of diandrous furnished a good distinguishing, though very artificial, character, as being opposed to others of nearly equal value. In a conspectus of the genera of the *Ruellieæ*, Nees divides them into two groups, viz.: A. "Stamina duo," and B. "Stamina quatuor." *Endopogon* is placed in the former, *Stenosiphonium* and *Strobilanthes* in the latter; but, as if to show that he attached little value to that mark, he refers a didynamous species to *Endopogon*, and a diandrous one to *Stenosiphonium*. This departure from the conspectus demanded a closer scrutiny of the extended characters of these and some other genera, which led to the conclusion stated above. The following extract from my Icones will explain my views on the subject, to which I may add, in confirmation of them, a circumstance overlooked when writing these remarks, that Nees' *Endopogon decurrens* is said to be sub-didynamous, "Filamenta hirsuta, antheræ breves et latæ, sub-didynamæ," an obscure expression, which however seems to indicate that the author's own mind was not clearly made up as to what were the true limits of these genera.

Endopogon, Stenosiphonium.

These two genera, as they stand in Nees' Monograph, can scarcely be viewed as distinct, though, at first sight, apparently, easily distinguished by the number of their stamens—2 in the former, 4 in the latter. But this distinction Nees has himself broken down by his *St. diandrus*, regarding which he remarks, "ambigit inter Endopogones et Stenosiphonia sed calyx vix usque ad medium divisus;" thus making the essential generic distinction rest on the greater or less depth of the clefts of the calyx, and not on the number of stamens, nor seed in the capsule, or in other words assigning generic value to a circumstance usually esteemed of scarcely specific note. To this high valuation I demur, and therefore in naming the following species, left the calyx comparatively out of consideration, and in lieu thereof made use of the number of seed in the capsule combined with the form of the corolla; viz. a campanulate limb, and long, slender tube, which is common to both.

Endopogon, corolla campanulato-infundibuliform, capsule 4-seeded.—Stamens usually two.

Stenosiphonium, corolla campanulato-infundibuliform, capsule 8-seeded.—Stamens usually four.

Thus the number of stamens and seeds in the capsule divides, into two genera, a group of species which the form of the corolla unites. So far all is easy. But the tetrandrous *Stenosiphonium* has at least one diandrous species, and according to my view, the diandrous genus *Endopogon* has a tetrandrous species in my *E. Strobilanthes*.

Here a new difficulty arises, *Endopogon* differs from *Strobilanthes* in the number of its stamens, and to some extent in the form of its corolla, the latter wanting the long slender tube, the limb being nearly the same in both. In my *E. Strobilanthes* there are 4 stamens, and the capsule is 4-seeded, hence, as regards the stamens and capsule, it is a *Strobilanthes*, with the corolla of *Endopogon*, while the calyx and stamens are those of *Stenosiphonium*. The two nearly allied species, *E. capitatus* and *foliosus*, have the stamens and capsule of *Endopogon* and the calyx of *Stenosiphonium*.

Ought in such a case an additional genus to be constructed for the reception of these 3 plants, which are all so closely allied in habit as to appear inseparable; or are we rather to stretch a point and admit them into one of the already existing 3 genera? The latter has appeared to me the preferable course, hence I have referred them all to *Endopogon*.

They all coincide with *Endopogon* in the form of the corolla and number of seed, and two of them further coincide in the number of stamens, but they all differ in having a 5-cleft, not 5-parted, calyx: but to that I attach only secondary importance. The inconvenience attending this course is the introduction of a didynamous species into a diandrous genus, which, however, is partly palliated by finding Professor Nees introducing a diandrous species into a didynamous genus, so that analogy is in its favour. Influenced by these views, and attaching only specific, or at most, sectional value to the extent of adhesion between the lobes of the calyx, I submit to

the consideration of Botanists, the following diagnostic characters of the three genera just named; the adoption of which will, I apprehend, obviate the necessity of an additional one in an order, perhaps, already overburdened with genera, some of them resting on imperfect observation of the structure on which they are founded. In saying that I think fewer might serve, it can scarcely be necessary to guard myself against being misunderstood in the opinion already expressed, that some of the existing genera may require sub-division, as that does not imply that all the existing ones will be found worthy of preservation.

ENDOPOGON. Flowers diandrous, rarely didynamous. Corolla campanulato-infundibuliform, with a long, slender tube. Capsule 4-seeded.

STROBILANTHES. Flowers didynamous. Corolla infundibuliform, tube short. Capsule 4-seeded.

STENOSIPHONIUM. Flowers didynamous, rarely diandrous. Corolla campanulato-infundibuliform, with a long, slender tube. Capsule 8-seeded.

The first and last differ in the number of seed, the second from both in the form of the corolla.

When this was written I had not studied with much attention the distinctive characters between *Goldfussia* and *Strobilanthes* but on doing so, found them still more obscure than the above. If the genera are really distinct, I feel certain that Nees has misnamed some of the species of both genera, mutually interchanging them, examples of which are given in the Icones.

ENDOPOGON CAPITATUS (R. W.), spikes abreviato-capitate: exterior bracts leaf-like, limb glabrous, the dilated base, calyx, ramuli, and petiols, thickly covered with rigid, glandular hairs: leaves ovate, acuminate, serrated; limb glabrous, densely lineolate.

Neilgherries, flowering March and April.

A large, ramous shrub, flowers pale blue, capsule about the length of the calyx, 4-seeded. In the figure it seems as if two-seeded, that is an error of the artist.

ENDOPOGON FOLIOSUS (R. W.), spikes abreviato-capitate, glabrous: exterior bracts leaf-like; limb ovate, acuminate, serrated: flowers diandrous: leaves long, petioled, glabrous.

Neilgherries, flowering March and April.

In habit and general appearance like the two preceding species, differing from the first in being every where glabrous, and from the second in its capitate not elongated spikes.

The three form a very distinct section of the genus, characterized by their large, exterior, foliaceous bracts.

ENDOPOGON STROBILANTHES (R. W.), spikes elongated, glabrous, exterior bracts foliaceous, oblong, lanceolate, or ovate, acuminate, longer than the calyx: calyx 5-cleft, segments lanceolate: stamens 4-didynamous: leaves broadly ovate, acuminate, serrated, glabrous, lineolate on both sides.

Neilgherries, flowering during March and April.

A large, ramous shrub, each ramulus terminating in a spike of pale blue flowers. In habit and in the foliaceous character, but not in leaf-like form of its exterior bracts, this species quite accords with both the preceding species; it also agrees in the form of the corolla, but differs in having 4, not 2 stamens. When in full flower it is a very handsome shrub.

ASYSTASIA.

Calyx 5-parted, equal. Corolla somewhat funnel-shaped, limb 5-lobed, equal, the upper lobe slightly concave. Stamens 4, didynamous within the tube, approaching by pairs; anthers 2-celled, cells parallel, appendiculate at the base, stigma capitulate, 2-lobed, or 2-toothed. Capsule contracted at the base, rough, often four-angled, 2-celled, 4-seeded, seed attached to processes, discoidly lobed, with a prominent angle at the base. Suffruticose or herbaceous, diffuse or climbing plants; racemes spike-like, one-sided, axillary or terminal; bracts small, equal; flowers blue or lilac or variously tinged with yellow, sometimes handsome.

Of this genus Nees describes 15 species. As a genus it is very natural and well marked by habit, independent of characters. It was on that account I introduced the present species, the only one I recollect meeting with on the Hills, feeling certain that, when one is well known all the others, at least of Southern India, will be readily recognized. Though this is true as regards the genus, I cannot promise as much for the species, as they are indeed very difficult and none more so than the present of which 7 varieties are enumerated as distinguishable. In regard to the one here represented, I am not quite sure that it belongs to any of these seven, if it does, it is to the first, but I rather suspect Nees would have viewed it as a distinct species. It however agrees so well with the character of the species, to which I have referred it, differing principally in the colour of the flowers, which I did not think of specific value, that I thought it better to place it here than make it a new species, which I feared could not be maintained. Nees doubts whether this genus and *Leptacanthus* are sufficiently distinct; for myself I see no reason to doubt it, as I cannot help thinking this one of the most characteristic genera of the tribe to which it belongs. On the plains its species abound, growing in hedges, especially in rich moist soil, and in such situations it is no

uncommon occurrence to see them climbing to the tops of hedges 10 or 12 feet high. In the low country I do not recollect to have met with a white-flowered one, deep lilac verging on purple being here the predominating colour, and then they are most beautiful, but unfortunately only two or three flowers open at once, and these are of short duration. The present, as regards the number and permanency of its flowers, is one of the most desirable forms for cultivation I have seen, and differing to this extent from the usual habit of the genus, led me in the first instance to view it as a new species to which I gave the characteristic name of 'albida,' but on after consideration I thought it but a variety of the already well known species, and named it accordingly.

Asystasia Coromandeliana (Nees), stem ramous, branches diffuse; leaves cordato-ovate, ovate, or suborbicular; lineolate-rough above: racemes axillary, long, secund, straight, calyx lobes acuminate.—Corolla about an inch long, funnel-shaped, yellow at the base. Capsule an inch long.

Slopes of the Neilgherries at a considerable elevation. The species, however, is common all over the country, flowering during the rainy seasons. The specimen represented does not present a characteristic form of the plant; and for some time I supposed it a new species, but the species being variable I cannot find characters by which it can be kept distinct. The flowers in the specimen were nearly white, specked with reddish-yellow spots: lilac is the usual colour.

LEPTACANTHUS.

Calyx deeply 5-parted, lobes narrow, the upper one often longer. Corolla funnel-shaped, limb five-lobed, somewhat unequal, the two upper ones larger. Stamens 4, didynamous not projecting; anthers at first cordate, afterwards oval; cells parallel, contiguous. Style filiform; stigma awl-shaped, curved backwards at the point; ovary 4-ovuled; ovules orbicular, borne on thick processes (retinacula). Capsule oblong, 2-celled from the base, 4-seeded, below the middle. Shrubby or herbaceous plants; flowers disposed in terminal trichotomous panicles, interspersed with small leaves; branches of the panicles opposite. Bracteoles wanting when the lobes of the calyx are very unequal, when nearly equal two, narrow, attached to the base of the calyx. Corolla handsome, blue or red.

So far as known to Nees, this is a small genus consisting of three species. I have however reason to suspect that it must be considerably enlarged, and can scarcely help thinking, that the accompanying species must yet be separated from the Ceylon plant, whose name I have given it. At the time the drawing was prepared and named, I had not seen the perfect fruit. That I have since obtained, and find that it does not agree very well with that attached to a specimen I have of the Ceylon plant. The seed represented on the plate, being some old injured capsules, does not give a very good idea of the perfect form, but is near it. That of the true L. Walkeri is longer, more slender, and less flattened. A careful comparison of the two plants will, I suspect, show other discrepancies, but in the mean time they must be admitted as very nearly allied species if not actually the same. Should they prove distinct, this may be called L. fruticosa, in allusion to its shrubby habit, sometimes attaining to the height of nearly 20 feet, with woody stems nearly as thick as a man's arm.

As the plate will show, it is a very handsome shrub, abundant in the woods between Pycarrah and Nedawuttim, but like many others of the order, labours under the disadvantage, for ornamental purposes, of not flowering annually. I have not ascertained the length of the intervals but feel pretty certain that it does not flower every year. After flowering it seems to die down to the root and spring up afresh, but on this point, too, I can only speak conjecturally, as I judge from the decayed appearance of some plants I saw after flowering, but mention the circumstance in the hope of directing the attention of persons resident on the Hills to it with a view to its elucidation. The following character is taken from Nees' character of the Ceylon L. Walkeri and may not quite correspond. The colour I have assigned is wrong, it ought to have been deep pink approaching to crimson.

Leptacanthus Walkeri (Nees), panicle densely glandulose-villous: lobes of the perianth linear-filiform, the upper one a little longer: cauline leaves oval oblong, pubescent beneath; floral ones, at least the primaries, ovate, acuminate, small.—Upper branches hairy, leaves with the petiol from 6 inches to a foot long 1½ to 3 inches broad, acuminate or caudato-cuspidate, lacinoe of the calyx narrow, very villous, the upper segment longer, straight: corol 9–10 lines long, cylindrical, ventricose, lobes of the limb subrepand, dark pink, or purplish coloured.

The specimens represented are from the Neilgherries, where it flowered in great perfection during February and March 1846.

GOLDFUSSIA.

Calyx 5-parted, about equal. Corolla funnel-shaped, limb 5-cleft, lobes obtuse, equal. Stamens inclusedidynamous, the lower ones often very short, reflexed; anthers nodding, with the oblique, ovate, membranaceous cells on a hooked glandulose connective. Stigma simple, subulate, irritable, crenate on one side. Capsule six-angled, valves easily separable from the dissepiment, cells 2-seeded; seed discoid supported on retinacula. Shrubs with serrated penninerved leaves, nerves curved, all tending towards the apex, but not reaching it. Flowers few, capitulate, rarely spicate, bibracteolate. Bracts deciduous. Spikes elongating after the fall of the bracts. Capitula pedunculed, with the peduncle simple or divided.

Under this character, Nees arranges 24 species, of two of these, I possess authentic specimens both of which are represented in my Icones. A close comparison of the generic characters with those of these species shows several discrepancies nearly as striking as those observable in the plant, which forms the subject of the accompanying plate, and helped to induce me to alter the name from *Strobilanthes* which I first gave it; subsequent consideration led me to doubt the propriety of the change and on again comparing it with both written characters, and the analysis of the true species, I cannot satisfy myself as to which genus it most truly belongs, perhaps to neither, but I think that I would now preferably refer it to *Strobilanthes*. In Nees' list of species, two are from the Neilgherries, taken up from specimens sent to Europe by the excellent Dr. Schmid, but which I have not been able to recognize among my series of Neilgherry *Acanthaceæ*, though pretty complete. My impression is that the characters of both these genera are too loosely constructed, and that both will require to be carefully recast, and further, that from among the present species, one or two new genera will require to be added to give uniformity and consistency to the whole. The genus *Strobilanthes*, as it now stands, is most heterogeneous and complex, but we are not the less indebted to the learned professor for his revision, not merely of the genus, but of the whole of this most difficult order which when he entered upon it was a truly herculean task. Now the labour will be a comparatively light one, a few only of the larger genera requiring to be thoroughly recast. Of the species published in my Icones, I consider *G. Dalhousiæ*, *penstemonoides*, and *decurrens* genuine examples: as already stated, I do not feel by any means certain of the one here given. One circumstance not noticed by Nees in his generic character is the inequality in the size of the two leaves coming off from each joint, a mark which I find constant in all those of which I have specimens, but according to the specific characters not found in all the species. Of two specimens, indeed, of *G. isophylla*, one has them very unequal, the other nearly equal, but notwithstanding that discrepancy I look upon it as a valuable character, while in the perhaps too nearly allied genus *Strobilanthes*, it is so rare that I doubt whether the species, in which it is said to occur, truly belong to that genus.

GOLDFUSSIA TRISTIS (R.W.), shrubby, erect, leaves unequal, elliptico-lanceolate, acuminate, acutely serrated, glabrous on both sides: inflorescence paniculato-spicate; spikes sub-capitate, long pedicelled, drooping, few- (above 2-) flowered, involucrate: involucral leaves or bracts? lanceolate, acute: lobes of the calyx long, ciliate at the apex: corolla infundibuliform, limb regular, tube very hairy within; stamens monadelphous at the base, anthers oblong: capsule 4-seeded; seeds near the base, the lower ones often aborting, upper oblong, obtuse, sub-truncate, pubescent.

Western slopes of the Neilgherries under shade by the road-side, about 2 miles below Sispurrah. Flowering February.

The generic distinction between Goldfussia and Strobilanthes is to me very obscure, and I am unable to say with certainty whether this species belongs to the one or other genus. At first I referred it to Strobilanthes, and fear, on reconsideration, that I have changed for the worse. Leaves with the petiol 6 to 10 inches long, flowers pale blue. Each capituluin, usually only 2-flowered, has 3 pairs of opposite bracts, as shown at fig. 4 of the plate. The pubescence of the calyx is not very well shown in fig. 3, the hairs lengthen as they approach the apex and are there long and matted.

STROBILANTHES.

Calyx about equal, 5-parted to the base; lacinea linear, somewhat broader towards the apex. Corolla funnel-shaped, the tube not passing abruptly into the limb; lobes equal or nearly so, rarely sub-bilabiate. Stamens four, didynamous, inserted on the middle of the throat, usually within the filaments, united at the base by membrane; anthers oblong, muticous, cells parallel, equal, contiguous, or in some diverging at the base, whence the anthers are sagittate. Stigma subulate, incurved or involute, spongiolose on the back. Capsule columnar, 4-sided, 2-celled almost to the base 4-seeded about the middle; partition thin, incomplete towards the apex, adnate, or sometimes separating from the valves. Seed discoid, angular, with an areola on both sides, the angles more prominent towards the hilum, attached to hooked retinacula. Herbs and shrubs, spikes more or less dense, axillary and terminal, erect, cernuous, or drooping. Bracts foliaceous or foliaceo-membranous, persistent or caducous, exposing the flowers, bracteoles small or sometimes wanting. Flowers, in most, delicate blue or white.

Under this very diffuse generic character Nees ranges 65 species. Some of these ought unquestionably to be removed to form the types of one or two new genera, and it is my impression some others ought to be brought here that are placed in other genera. The character itself is, according to my ideas, much too diffuse, which however is corrected by an abreviated essential character in these terms, "Calyx 5-parted, subequal. Corolla funnel-shaped subequal. Stamens incluse, sometimes monadelphous; anthers straight, muticous. Capsule 4-sided not unguiculate, 4-seeded in the middle. Spikes axillary and terminal, usually compact, broadly bracteate and cone-like, in some loose." To illustrate this genus three plates are given. The first, *S. sessilis*, is I believe a true representative—the second, *S. Wightiana*, ought in my opinion to form the type of a new genus which might include my *S. luridus*, and *S. micranthus*, all readily distinguishable by their peculiar stamens, which are totally unlike those of all the other species I have examined. So long as *S. luridus* was the only one I knew having that peculiarity, I considered it a new genus, but on finding it correspond with one of Nees' species I submitted to his authority, and placed it in this genus, I now think, erroneously. As it now stands, in De Candolle's Prodromus, this is a very difficult genus as regards the determination of the species, which I think might have been to some degree obviated by greater care in their subdivision and grouping, hence the desirableness of having the whole genus recast.

STROBILANTHES SESSILIS (Nees), suffruticose, very hairy, stem erect, 4-angled: leaves sessile, ovate, acuminate, crenate, spikes axillary, opposite and terminal; bracts ovate, cuspidate.—Stems 2–3 feet high, leaves scarcely an inch long, ovate or sub-cordate, crenate: spikes about an inch: calyx about ½ an inch long, the lobes lanceolate, the two lower ones narrower. Corolla about an inch long, varying from pale blue up to purplish. Stamens shortly monadelphous at the base, joined by a membrane. Capsule oblong, smooth, obtuse or somewhat attenuated at the base, 4-seeded in the middle.

STROBILANTHES PERROTTETIANUS (Nees), shrubby, branches reddish, hairy: leaves ovate, caudato-cuspidate, undulato-crenate, hairy, very rough above: spikes axillary, opposite, secund, oval, nodding, dense, hairy; bracts ovate, acute, the interior ones larger, thiner, and coloured; stamens monadelphous.—An erect shrub, 3–8 feet high, thickly covered with brownish-purple bristles, becoming smoother by age: leaves 4–8 inches long, 1 to 2 broad, hairy; peduncles 1-3 inches long, simple or bifid or trifid, naked. Spikes about an inch long, compact, hairy. Corolla pale blue, from 9 to 12 lines long, tube narrow, throat inflated. Stamens incluse, united by a hairy membrane, capsule contracted at the base, compressed, 2-seeded in the middle.

Neilgherries, not unfrequent on the outskirts of clumps of jungle about Ootacamund.

STROBILANTHES LURIDUS (R. W.), a large, ramous shrub; branches virgate, bearing the inflorescence on the lower naked portions: leaves oval, oblong, acuminate, pubescent on both sides, finely serrated; spikes ascending, one or two together, opposite: bracts large, orbicular, emarginate or slightly retuse at the apex, dark livid brown; bracteoles linear, obtuse, about the length of the calyx: calyx 5-parted, lobes lanceolate with a row of bristles on the back: corolla 5-lobed, lateral lobes reflexed, hence apparently bilabiate: stamens united by pairs at the base, all equal, exerted; anthers oblong: capsule about the length of the calyx, somewhat compressed, 4-seeded: seed orbicular, glabrous.

Neilgherries, in wood near Nedawuttim. Flowering January and February 1846. When I visited the station in 1847 and 1848, I did not find it in flower though I found the plant in abundance, hence it seems only to flower once in several years. Corolla deep purplish brown, scarcely exceeding the large dull lurid bracts.

I at first considered this the type of a genus near Strobilanthes and proposed calling it, with reference to the stamens, *Didyplosmndra*, thinking that they, added to the peculiar habit, were sufficient to constitute this a distinct genus. But on comparing them with those of *S. Wightiana*, a species (of which I had specimens named by Nees himself) with which they correspond, it did not appear that the other differences were of generic value, or such as to call for its separation from that genus as now constituted. My own impression, however, is, that they, and some others to be noticed, ought all to be removed, and the genera *Goldfussia* and *Strobilanthes*, either united or recast on amended characters. As they now stand they can scarcely be said to be distinguishable.

ADHATODA.

Calyx deeply 5-cleft, lobes equal. Corolla ringent, tube shortish, upper lip concave, lower 3-lobed. Stamens 2, inserted below the middle of the tube; anthers 2-celled, cells oblique on the connective one somewhat above the other, the lower ones spurred. Stigma obtuse, capsule depressed! four-seeded in the middle; seeds either lenticular or flat. Herbs or shrubs: flowers various in form: leaves quite entire. Spikes either axillary opposite, or the flowers axillary, or the spikes terminal. Bracts and bracteoles often large, longer than the calyx, flowers either opposite, or, by abortion, one ranked.

Of this genus, Nees, in his recent monograph, in De Candolle's Prodromus, describes 98 species; about 20 of which claim India as their native country. Generally they are inhabitants of the warmer regions within the tropics, hence they are rare on the Hills. The one here being almost the only species found at so high an elevation as Dodabet. It is found all over the higher ranges of the Hills lying flat on the ground, nestling among the grass, if in open exposed situations, but when growing among bushes or under shade, shows some tendency to take advantage of the support and become more conspicuous. It is rather pretty when seen among the deep-green coloured grass to which its cream coloured bracts and light green leaves form a contrast, but apart from these accompaniments, it has little to recommend it to the attention of the florist.

ADHATODA NEILGHERRICA (Nees), leaves lanceolate, sessile, glabrous, smooth: spikes terminal, 4-sided; bracts and bracteoles ovate, acuminate, venoso-3-nerved, glabrous.

Neilgherries, frequent in pastures about Ootacamund, where it is always in flower. A low procumbent plant, lying flat on the ground, but rendered conspicuous from the grass, among which it grows, by its numerous pale-coloured spikes, which ascend a little above the rest of the plant.

ANDROGRAPHIS.

Calyx deeply 5-parted, equal, lobes narrow. Corolla 2-lipped, upper lobe entire or bifid, inferior trifid, unless when resupinate, when the contrary is the case. Stamens two, anthers two-celled, cells parallel, bearded at the base. Capsule ovate, or lanceolate, depressed, 2-celled to the base, 4- or many-seeded; partition attached to the valves. Seeds oval, obtuse, roundish; obliquely truncated at the base, pitted thimble-like, with a deep hilum. Herbaceous annuals or under shrubs, decumbent or erect, stem and branches acutely 4-angled, racemes axillary or terminal, simple or forked; flowers opposite or all turned to one side. Bracts opposite, shorter than the calyx, bracteoles wanting, or two, minute, at the base of the pedicel; flowers more or less rough or glandular, white or variously purple; lobes of the calyx linear or filiform, capsule linear, oblong, flattened.

Of this genus Nees describes 11 species, but this is not one of them. He separates this and a congener under the name of *Erianthera*, partly on the ground of difference of habit which would have been well enough had the distinction been made to rest on that alone, but that not being the principal reason and moreover *habit* not generally being admitted as of generic value, I do not think it right to admit it here apart from the difference of structure erroneously assigned. The essential distinguishing characters assigned to the two genera rest on assumed differences of the anthers which do not exist, namely, *Eriantheræ*, "inferior cell of the anthers abortive reduced to a woolly beard." *Andrographis*, "anthers 2-celled, cells parallel, bearded at the base." A reference to the magnified figures of the anthers will at once show that they correspond with the character of the last and that this is therefore a genuine species of *Andrographis*, though differing in habit, and that this therefore, and his other species, can at best form but a section of the genus distinguished by its depressed diffuse habit. The genus *Andrographis*, is so named, somewhat fancifully, perhaps, in allusion to the tuft of hairs on the end of the anthers resembling a camel-hair pencil, and may, I fancy, be translated Pencil-beard. It is an interesting one to the Indian Botanist as including the Creyat, well known as affording a very fine bitter, quite equal to the officinal Gentian, and celebrated as the basis of the French Drogue-amere, an excellent tonic. The Creyat, (*Andrographis* (or Justicia) *paniculata,*) is a very generally diffused plant in the stunted jungle, which covers the low rocky hills so common in the Peninsula, as well as along the bases of all our

greater ranges of mountains. With the exception of this, and another species common in Mysore, the genus consists of erect growing plants the stems of which are acutely 4-sided, with the smallish flowers borne on axillary shoots, generally all turned to one side, some however have them, as in the accompanying, ranged in opposite pairs, along the branch. There is therefore nothing to separate this from them, except its procumbent habit, a view in which I think Nees himself will coincide on re-examining them. This plant is, like the preceding, found nestling among the grass, all over the Hills, but requires to be looked for, otherwise it may easily be overlooked by the unpractised eye. It strikes me, it might with advantage be introduced into gardens from the compact tufts of purple flowers which it forms.

ANDROGRAPHIS LOBELIOIDES (R. W., *Erianthera*, Nees), herbaceous, diffuse, procumbent: leaves subovato-orbicular, mucronulate, flowers terminal, racemose.

Neilgherries, rather frequent in pastures, nestling among the grass, but quite conspicuous from its tufts of brownish purple flowers. Nees has separated this and a nearly allied species from Andrographis under the name of *Erianthera*, on account of the anthers, "Antheræ loculus inferior abortivus in barbam laniformem solutus." As this is certainly not the case in either of the two species, I have taken the liberty of restoring both to *Andrographis*. See plate 517. The tuft of wool in this species is on the back of the connectivum, but not well shown in the figure.

SCROPHULARIACEÆ.

This is one of those families which, from the uniformity of its characters and the vast number of its species, tend to show in a striking light the advantages of the natural system of botany over the Linnean sexual, or indeed any other artificial one. The family embraces upwards of 2000 known species, and nearly 200 genera, all, except one or two genera, having irregular flowers, 2 or 4 stamens, in the latter case usually didynamous, a free 2-celled ovary, axile placenta, and numerous minute albuminous seed. In the sexual system, the species are distributed among four classes, unconnected with each other, and grouped among genera having no relationship with each other. Here, on the other hand, they are all so closely associated that it is often difficult to draw the line between them. The genus *Verbascum*, not unfrequent about Ootacamund, is one of the exceptions referred to above, it having regular pentandrous flowers, and to that extent is more justly referable to *Solanaceæ*, but is necessarily kept here through the medium of *Celsia*, a true member of the order, but which only differs from *Verbascum* in having 4 in place of 5 stamens, so that it might either be viewed as a tetrandrous *Verbascum* or, *vice versâ*, *Verbascum* as a pentandrous *Celsia*, hence the affinities, generally, being with the Scrophulariaceæ it is placed in this order. This circumstance is interesting and worthy of notice as showing how orders that are really natural pass into each other. Leaving out the distinctive characters of the flowers, *Solanaceæ* and *Scrophulariaceæ* would become one, but by admitting them into the respective essential characters they are easily kept distinct; the flowers of *Solanaceæ* being regular and symmetrical throughout, while those of *Scrophulariaceæ* are very generally irregular and unsymmetrical. Dr. Lindley, in his "Vegetable Kingdom," lays great stress on this distinction, and on the strength of it separates the two orders to a considerable distance, though thus actually passing into each other by an almost imperceptible transition.

An order so extensive has, as a matter of course, relationships with many other orders besides the one mentioned, but none so very close, with the exception perhaps of *Orobanchaceæ*, several of the species of which have been referred here. Orobanchs differ in habit, all the species being parasitic leafless plants, the stems being furnished with scales in place of leaves, but the flowers and seed are nearly the same in both, the essential

difference therefore is found in the ovary which has parietal, not axile, placentas as in true Scrophulariaceæ, a distinction however not always easily made out. *Cyrtandraceæ* is another order which very nearly approaches this, having similarly formed flowers but having, like the Orobanchs, parietal placentas.

This order has a very extended geographical distribution, but most abounds in the northern hemisphere. In India, the number of its species is certainly considerable, though small as compared with the whole order, but then they are found all over the world, extending from the Arctic to the Antartic circle, from Melville Island to Terra del Fuego. In India, they are found in all soils and situations from the sea shore to the tops of the highest mountains, in marsh and on the most arid plains, in the deepest recesses of the forest and exposed to the full blaze of our tropical sun.

With the exceptions of *Digitalis* and the officinal *Gratiola*, the properties of this family are not of much consequence. The former is important as supplying a peculiar narcotic, remarkable for its power of allaying and modifying excessive or irregular action of the heart, while, at the same time, acting as a powerful diuretic. The other *Gratiola* is an active drastic. Many of the species are admired for their handsome flowers and find a place in the flower garden, not the least worthy of which is the *Torenia asiatica*, found as a weed by the road sides on the Hills: though little thought of there, immediately it found its way into English gardens it took its place among the choice prize flowers of their floral exhibitions. Many species of Digitalis have handsome flowers and are very ornamental, while the Snap-dragons and Toad-flaxes are found in almost every garden. Several of the Hill species might be turned to similar account, and growing in their native climate might, with the aid of appropriate culture, become interesting additions to the flower border. *Limnophila hypericifolia*, is a very beautiful species, but inhabits marshy ground and might not perhaps take kindly to the garden, but if it did, and the flowers enlarged under cultivation, and their present lilac colour deepened into blue or purple, which I think probable, as some of the other species have very deep blue flowers, it would become very ornamental, the flowers contrasting favourably with the bright shining green of the leaves. The *Pedicularis* is also well worth cultivation, could it be made to flower at other than its natural season, as it is then too common to meet with much notice in the garden. Another species of the genus, *P. Perrottetii*, which I have never had the good fortune to find growing, but which is found in valleys of the Koondahs, is really a most charming plant, and deserving of every care in cultivation. Its flowers are nearly 4 inches long, and I am told pure white. It ought to be in every garden.

VERBASCUM.

Calyx deeply 5-cleft or 5-parted, rarely 5-toothed. Corolla spreading, wheel-shaped, rarely concave, lobes somewhat unequal. Stamens 5, the three posterior ones, or all, woolly, rarely naked. Style flattened at the apex, thickish. Capsule globose, ovoid, or oblong, dehiscent. Herbs, usually biennial, rarely perennial or suffruticose, usually erect, tall, more or less tomentose, or covered with fleecy wool. Leaves all alternate, the radical ones usually large, long-petioled, the cauline ones progressively shorter, more sessile or decurrent. Corolla ephemeral, yellow, brown, purple, or red, rarely white.

Of this vast genus, including nearly 100 species, 4 only are found in India, and two of these common to Europe, so that one might almost suppose they had been introduced with grain seed and become naturalized. In general appearance they so greatly resemble *Celsia*, one species of which is also found on the Hills, that they might almost be mistaken, but are generally easily distinguished by the flowers,

Verbascum having 5, *Celsia*, 4 stamens. *V. virgatum* often attains a great height. I have measured plants upwards of 8 feet high, and believe that taller ones may sometimes be met with. It is interesting in connection with the climate, as showing how much that of the autumnal months of the Hills assimilates with that of summer in Europe.

VERBASCUM VIRGATUM (Withering), stem subviscoso-hispidulous or glabrous at the base: leaves oblong, glabrous, or glanduloso-hispid beneath; the inferior ones petioled, dentate, or sinuato-pinnatifid; the superior ones sessile or cordato-amplexicaul, or shortly decurrent: racemes glanduloso-hispid; pedicels 2 or 3 together, rarely solitary, shorter or about the length of the calyx: filaments clothed with violet-coloured woolly hairs (violaceo-lanatis).

Neilgherries, frequent, flowering during the rainy season.

This plant not unfrequently attains the height of from 6 to 7 feet, though from 3 to 4 is the more common size. Flowers yellow, nearly sessile, the short bent filaments densely clothed with purplish-coloured, woolly hairs.

LIMNOPHILA.

Calyx deeply 5-cleft, or parted, equal or with the posterior lobe larger. Upper lip of the corolla emarginate or 2-lobed, the lower one 3-lobed; throat not plicate, stamens 4, incluse, cells of the anthers separate, oblong, often stipulate. Style deflexed at the apex, dilated, entire, or shortly bilamellate, often two-winged at the flexure. Capsule ovate, globose or compressed, the valves splitting along the back (loculicide bivalvis) the valves afterwards 2-parted; the slightly inflexed margins separating from the broad placentiferous partition. Tropical, herbaceous, marshy or aquatic plants, often punctuate with pellucid glands, leaves opposite or 3–4-verticelled, the lower submerged ones in aquatic species capellacio-multifid. Flowers oblong, axillary, or the upper ones disposed in a leafy raceme, the calyx often bibracteolate.

Of this genus Mr. Bentham has described 22 species, 20 of which are natives of India; the other two are from Java. This therefore is almost a purely Indian genus but is not confined to India, several species being found in other countries, the Eastern Islands, Java, Australia, &c., a common occurrence in the case of aquatic plants, many of which occupy a very extended geographical range. The specimen here represented grew in some swampy ground in Kotergherry, attaining the height of between 3 and 4 feet, flowering in August and September. It is a pretty plant when in full flower but loses its beauty as the seed advance towards maturity.

LIMNOPHILA HYPERICIFOLIA (Bentham), glabrous, rooting at the base, ascending: leaves sessile, ovate, oblong, obtuse, cordately semiamplexicaul at the base; the floral ones smaller: racemes terminal or axillary: flowers sessile, becoming remote: calyx deeply 5-cleft, divisions lanceolate, the posterior one larger.—Herbaceous, repent at the base, scarcely branched, 1–2 feet high. Leaves about an inch long, punctuate. Corolla 7–9 lines long. Style winged at the bract with 2 acutish falcate auricles. Capsule short, valvate, bifid.

Kotergherry, Neilgherries, in swampy ground, flowering in August.

PEDICULARIS.

Calyx tubular, or campanulate, more or less cleft in front, 2- or 3-toothed at the apex, teeth rarely equal, the lateral ones connate or free, cristato-dentate or entire, the middle one usually the least or sometimes wanting. Tube of the corolla cylindrical or more or less enlarged at the throat, the hood compressed, obtuse, entire, or furnished with a tooth on each side, or prolonged into a truncated or bidentate beak: lower lip often two-crested, 3-lobed, lobes spreading or deflexed, the middle one smaller, exterior in æstivation. Stamens didynamous, concealed under the hood, filaments often hairy towards the base: anthers transverse, approximated by pairs, cells equal. Capsule compressed, ovate or lanceolate, more or less falcate or oblique, especially at the apex, spliting along the back from the apex, to near the base, and for a short space in front, the valves bearing the partition. Seed in the lower part of the capsule attached laterally, ovoid, rather large, the testa loose or closely attached, foveolate or smooth. Embryo small, radicle pointing to the apex. Herbs, usually alpine, leaves alternate or verticelled, rarely opposite, in most pinnatifid or rarely simply dentate, decreasing in size from the radical to the floral ones. Flowers spicate, bracteolate; floral bract-like leaves like the cauline ones.

Under this very extended generic character, Mr. Bentham ranges 109 species. The genus is a most natural one, so much so, that out of so large an assemblage only seven plants are excluded as having been erroneously referred, a truly rare case, especially in genera of such ancient date, this being a Linnean one. Like all very natural, large genera, the discrimination of its species is attended with much difficulty. The one here represented is so variable, that it might almost be split into two or three for being generally distributed in both humid and dry soil, it assumes very different forms according as it grows in the one or other, sometimes quite erect, as in the specimen selected by the artist, at others ramous, all the branches lying flat on the ground without any central shoot. It also varies more or less in the depth of colour of its flowers. In all its forms however the hood or helmet (gales) is blunt or without a beak. There is another nearly allied Himalayan species, but not, so far as I have observed, found on the Hills, having the apex prolonged into a tapering beak, a character by which it is at once distinguished from this. Of the 107 species belonging to the genus, 20 only are natives of India, mostly from the Himalayas. Two are indigenous on the Neilgherries, one of them only found there, the other, *P. zeylanica*, has a wider range, being found on other hills and in Ceylon.

When dried for the herbarium they lose their colour and change to a dirty black.

Pedicularis Zeylanica (Benth.), furfuraceo-pubescent, or rarely nearly glabrous; loosely ramous at the base; branches ascending or erect: leaves petioled, oblong, obtuse, doubly crenate: racemes capitate or elongated: calyx cleft along one side, cristately 2-3-toothed behind: tube of the corolla shortly exserted; helmet incurved, obtuse, erostrate. —Except in the helmet, this species is very nearly allied to P. carnosa, in that it is beaked in front, in this obtuse, beakless. This species which is very abundant on the Neilgherries is, when in perfection, a truly beautiful flower. It varies considerably in its habit, growing, as in the instance selected for representation, quite erect, and having very few branches, even at the base, or loosely diffuse without any central stem, only a number of loose, procumbent branches, springing on all sides from the crown to the root, each ascending towards the apex and terminating in a more or less elongated raceme of beautiful pink flowers. It commences flowering in June and July and continues until the end of the rains.

SOLANACEÆ.

This is a large and in many respects an interesting family, on account of its peculiar properties. As already remarked it very nearly coincides with *Scrophulariaceæ* in its botanical characters, mainly differing in its regular pentandrous flowers, these, in *Scrophulariaceæ*, being irregular with either two or four didynamous stamens. The ovary is the same in both, but the fruit is not equally uniform, being in some genera of *Solanaceæ*, baccate, and in others capsular, while in the other it is almost always capsular. But as regards properties they are very different, those of *Scrophulariaceæ* being, with a few exceptions, of small note, the plurality being nearly valueless to man, while those of *Solanaceæ* are in many instances highly energetic, furnishing, according to their mode of application, valuable remedies or deadly poisons. To this order we are indebted for Hyoscyamus, and Belladonna, two most valuable narcotics. To it also belongs the mischievous Datura, the narcotic properties of which are but too well known in India, but scarcely enough known to the Physician, since it is probable that if they were better known to him, he would find preparations of this plant in some cases even more valuable than either opium or henbane in inducing sleep in cases of extreme watchfulness and irritability. Its antispasmodic power in relieving asthmatic fits have been long known, but not much relied on, as it is seldom prescribed, perhaps from the uncertainty of its action. It is more used in India than Europe for this purpose, it being one of the native remedies often used for the palliation, at least, of this distressing disease. The most generally and extensively consumed plant of the order is perhaps the Tobacco, the fascinating qualities of which in form of smoke and snuff have made it an almost universal favourite, with all classes and

conditions of men, though well known to be a most energetic poison when received into the intestinal canal. I have known a child deprived of life in a few minutes from the administration of a too powerful Tobacco enema. The berries of the Bittersweet *(Solanum dulcamera)* are also intensely poisonous as proved by the frequency of fatal consequences to children who have ignorantly partaken of them. To set against these, this family furnishes the Potatoe to the world at large, and the Brinjal to the tropics and warm latitudes on either side, as nourishing esculents, equally prized by rich and poor; the so-called Brazil cherry *(Physalis Peruviana)*, as a fruit, and the Capsicum as an equally generally esteemed warm condiment with which to season the insipid vegetable diet on which Natives of tropical countries so largely subsist. And, lastly, it gives us the delicate Tomata the delight of the genuine Epicure. These examples show how largely mankind are indebted to this family for medicine, food, and luxuries: and, as if unwilling to leave any of his wants unprovided for, Brazil furnishes a Solanum which the inhabitants consider equal to the true Cinchona, in curing their fevers.

This order contains about 1200 described species, but there are very many more collected in herbaria still undescribed, but which I presume we may ere long hope to see brought to light, through the medium of De Candolle's Prodromus, when the monograph of the family appears in that great work, but which, unhappily for science, it has not yet done. Of the named and described species, nearly 100 belong to the Indian Flora, but many of these have been reduced to the rank of varieties by Professor Nees Von Esenbeck in a monograph of the Indian Solanaceæ, published about 16 or 17 years ago in the Linnean Transactions. Whether future Botanists will adopt these reductions remains to be seen.

In its geographical distribution it occupies a wide range, extending from the tropics through both temperate zones, but are most abundant in the warmer regions. In India the species are not numerous, though individually abundant: they are found in nearly all situations in shade and sun-shine; in low moist grounds and elevated parched ones; on heaps of rubbish and in the best cultivated gardens, on the sea shore and tops of the loftiest mountains. Of the Peninsular ones none seem prized as ornamental objects, though the Datura, were it a less common and dangerous neighbour, might, on account of its large handsome trumpet-like flowers, merit a place in the shrubbery, the more so as it shows a strong tendency to become double, often presenting three or four corollas one within the other, like graduated sets of chemical test tubes. The Petunias are generally admitted into gardens and are deservedly prized as ornamental objects.

SOLANUM.

Calyx 4-5-8- or 10-cleft or toothed, persistent. Corolla rotate or rarely campanulate, plicate four- or five-cleft or sinuately angled. Anthers connivent, opening at the apex by two pores, equal, or sometimes the lower ones larger. Berries two- or rarely several-celled, many-seeded, naked. Seed glabrous, reniform. Embryo curved spirally round the edge enclosing the albumen. Herbs, shrubs or trees, unarmed or furnished with prickles, glabrous or hairy, the hairs sometimes stellate: leaves alternate, solitary or in pairs, one usually smaller, entire or variously divided: flowers above the axils lateral or rarely terminal, solitary, paired, fascicled or umbelled, racimose, cymose, or corymbed, rarely panicled; corolla white or purplish rarely yellow.

This as it now stands recorded in Walper's Repertorium Botanicum and Annals is a genus of vast extent, including about 600 species and as may be surmised from the conclusion of the generic character

is most polimorphous in its aspect, so much so that I can scarcely suppose that all the species now referred to it will long be permitted to retain the name; still less can I suppose that all its present interminable list of species will be retained, when once taken in hand by a competent Botanist with adequate materials for the determination of what are and are not good species. Nees, by being provided with such a series, was enabled to reduce those of the Indian Flora, by nearly a half. Previous to his examination it was a task of the most irksome kind to determine any species from a dozen specimens taken from as many different plants, as among them representatives of several could usually be found and then it was impossible to say which was the right one. The case is now altered, it being about as easy to make out the species of a Solanum as of any other genus, except in one or two instances where he seems to have carried his retrenchments a step too far. This I suspect is the case in the example I have selected to illustrate the genus. But whether or not I am in error in this supposition, I feel certain that the plant represented is correctly named, according to his list. It is common in woods about Ootacamund.

SOLANUM PERROX (Linn.), perennante-herbaceous, woody at the base: leaves paired, cordate, sinuately angled, woolly tomentose and prickly on both sides: peduncles intra-foliaceous and, like the short pedicels calyx and berries, hairy.

Courtallum, flowering August and September, and Neilgherries always in flower.

SOLANUM PERROX, minus. (Nees.)

Neilgherries.

Nees Von Esenbeck views these two forms as but varieties of the same species. I think there is room for dissenting from that view, but yet, I for the present adopt it, as my opportunities of examining the correctness or otherwise of his opinion have not been such as to satisfy me on the subject. One circumstance is worthy of note, namely that the former of these plants, No. 1399, has not, so far as I am aware, been met with on the higher range of the Neilgherries, while the other is quite common. That difference of habit, combined with its glabrous fruit, causes me to doubt the correctness of Nees' decision in this instance.

CONVOLVULACEÆ.

This is a large and beautiful family, many of the species of which are very deservedly much admired for the elegance of their forms and the richness of the colours of their flowers. Most of those found on the Hills are rather defective in these particulars being, for the most part, large coarse-growing plants and the flowers, without sufficient variation in their colours, a rose pink being the predominating one. The one here given is the only species of *Convolvulus* I have met with, the others belonging to the genus *Argyreia*. The difference in generic characters between these two genera is not at first sight very conspicuous, and requires the aid of magnifying glasses to detect, as being found in the ovary and stigma. In this the style splits at the apex into two linear stigmas and the ovary has 2 cells, with 2 seed in each, while in *Argyreia* the style terminates in 2 rough globular heads and the ovary has 4 cells, with one seed in each. A more easily detected distinction is found in the fruit which, in Convolvulus, is a dry capsule, in Argyreia a fleshy berry. This last, the baccate fruit, is a peculiar feature in this order, and serves to unite into one group 3 genera which, when thus separated from the rest, are easily distinguished from each other by these brief characters. *Rivea* has two prolonged stigmas like *Convolvulus*, and a 4-celled ovary, to which may be added a long narrow-tubed corolla. *Argyreia* has a capitate 2-lobed stigma and 4-celled ovary, with a short tubed campanulate corolla. *Lettsomia* is like Argyreia but has a 2-celled ovary, with 2 ovules in each cell, to which may be added that the stamens are sometimes longer than the corolla and exserted. This last however is not constant. The genus *Ipomœa*, which is a very large one and very common in India, is distinguished from the last by the fruit only. It has a dry capsule which splits into two halves, has 2 cells and 4 seed, capitate 2-lobed rough stigma; a campanulate corolla is common to both. By these simple marks these four genera which contain the bulk of the species of this family, found in India, are readily distinguishable: the species, which are numerous, are of difficult discrimination.

The family is very widely distributed over the world, but very decidedly predominates within the tropics and warmer portions of the temperate zones. A few, however, extend almost to the confines of the frigid zones. Three are natives of England, and several others of Europe.

The properties of this family are somewhat peculiar; one species yields the well known sweet potatoe of India; another, the still better known Jalap of the druggist; and a third the Scammony. The two last are natives of America, and, what is remarkable, a variety of the Jalap plant yields large tubers which have lost the cathartic property of the species and are used as food. The roots of *Ipomœa turpethum*, an Indian species, possesses properties similar to those of Jalap, and are in use among the Natives as a substitute for that medicine. Several other species are used medicinally by the Natives, and a very large and handsome plant has got the name of snake-creeper, under the impression that snakes will not approach it! a foolish fancy, as I have seen snakes taking shelter under the abundant cover it affords for their concealment to such an extent that I was obliged to destroy a handsome arbour of it to get rid of them. Many of the species are cultivated for their beauty; two, known under the name of scarlet creepers, species of the genus *Quamoclit*, are much prized for arbours, but, like many of the family, labour to some extent under the disadvantage of early dropping their flowers. The moon flower *Calonyction speciosum*, formerly *Ipomœa bona-nox*, is quite remarkable on this account, opening its large handsome flowers about sun-set and dropping them a little after sunrise, whence the name "good-night flower." One of the most highly prized of the family for its ornamental qualities is the *Pharbitis Nil* which, in its native state, has rich blue flowers, but under cultivation becomes beautifully varigated, with the further advantage of retaining its flowers nearly the whole day.

CONVOLVULUS.

Sepals 5. Corolla campanulate. Style 1, stigmas 2, linear, cylindrical, often revolute. Ovary 2-celled with 4 ovules, capsule 2-celled. Herbs or shrubs.

Under this character M. Choisy gives characters of 117 species, several of these however imperfectly known. Of that long list the only one I have ever seen on the Neilgherries is the one here represented, which is a comparatively decumbent plant twining among grass, and though, when examined, not destitute of beauty is yet most modest and retiring in its habits. Were it introduced into the garden and made to twine on low bushes so as to bring its delicately-coloured flowers to light, I cannot help thinking it would soon find a place in most gardens, to the exclusion perhaps of some of the exotics, which require much more care and are less deserving of it than this, and many other native plants, which I am most certain would be highly prized in English gardens, though so completely neglected in their native country. It is to be hoped a change in this respect will ere long come over the tastes of European sojourners, on these health-giving mountains, and especially of permanent residents, proprietors of houses and gardens.

CONVOLVULUS RUFESCENS (Choisy), stems rusty red: leaves hastato-cordate, acute at the apex, mucronulate; sinuate on the margin, 2 inches long, the auricles crenato-lobate; petiols 7 lines long: pedunclos short, 1–3-flowered: bracts minute: pedicels 3–6 lines long: sepals ovato-acuminate, ciliate, acute, 3 lines long; exterior ones pubescent: corolla 5–6 lines long: capsule glabrous.

Neilgherries, not uncommon.

A procumbent plant, spreading to a considerable extent among long grass.

BORRAGINEÆ.

This, as it now stands in De Candolle's Prodromus, is a large and complex order, and viewed as a whole is one admirably adapted for giving scope to disquisitions on natural affinities and what ought to constitute the limits of natural orders, and especially on the value we ought to assign to the characters we select for their circumscription. Such being the case it has naturally given rise to considerable difference of opinion, among Botanists, on these subjects; some agreeing with De Candolle in viewing the whole as one order, but divisible into several tribes or sub-orders; others esteeming these tribes as entitled to rank as distinct orders, but disagreeing as to the genera that ought respectively to belong to each. In a word, it threatened to become a chaos, when the elder De Candolle undertook its revision for his immortal Prodromus. Aided by rich collections and with the opinions of all his predecessors before him, he finally arrived at the conclusion that three orders, which others had constructed, formed but one, which he thought could not be divided. Under this conviction he reunited the separate parts under one ordinal name, but still retained them so far distinct, as to constitute tribes or sub-orders of them. In this distribution, I am quite prepared to follow him and feel all but certain that, for the future, others will do the same, as even then, it is not more complex in its composition than *Loganiaceæ* or *Verbenaceæ*. But supposing that in this I am mistaken, and that it is divided, then I think it must be broken either into two or four orders, not three, as has hitherto been done.

The higher ranges of the Neilgherries furnish representatives of three of these tribes, the fourth, *Cordieæ*, I have not seen at any considerable elevation. The three accompanying plates only represent two of these tribes, two of them belonging to one, but they represent extreme forms, the first forming the type of the tribe *Ehretieæ*, the second the extreme genus forming the transition to *Heliotropeæ* and in some of its species scarcely distinguishable; the third appertains to the tribe *Borrageæ* which more properly constitutes the European division of the order, distinguished from the other two by the ovary, and fruit, aided by the position of the style. In the former it springs from the top of the ovary, in the latter it descends between the carpels and seems to be a prolongation of the pedicel of the flower, round the base of which the carpels, or cells of the ovary, are placed.

Viewed as a whole, the order, like those above-mentioned, is complex, but upon the whole, though presenting great variations of form, natural. For example, we find among its species handsome trees, low shrubs, and some very humble herbaceous plants, thus furnishing all forms of vegetation, but still a family likeness is seen to pervade the whole. In its geographical distribution it occupies a wide range, extending from the equator to either polar circle, but in that it is not singular. The flowers are generally bisexual, but sometimes in *Cordieæ* dioicous, usually they are quite regular, but in some of the species of *Borrageæ* they show a tendency to irregularity in the form of the corolla, but even in the most irregular, there are 5 stamens. The ovary, as seen in a cross section, is four-celled, but composed of only two carpels, the edges of which are folded in and bearing an ovule on each edge. As the fruit approaches maturity they become hard and nut-like, and in the tribe Borrageæ separate from each other, leaving the remains of the style adhering to the base of the flower.

This last forms a distinction so marked from the preceding sections, and there is moreover a difference of habit, that it might well enough entitle it to rank as a distinct order, but the rest are better kept together as one. The differences between Cordieæ and Ehretieæ is much insisted on by many Botanists, and are no doubt considerable, but certainly not so great as we find between the different tribes of Verbenaceæ.

As regards properties, they are not of a high order. The Cordias and Ehretias sometimes attain sufficient size to furnish timber. The roots of a species of the latter are used by the Natives as a substitute for Sarsaparilla, and some of the herbaceous forms are used medicinally, but possess no active property. A few of the European species are admitted into the flower garden as ornaments, among which is the little Forget-me-not *(Myosotis palustris)* a species of *Borragao* and an *Echium*, but the finest of all is the fragrant Heliotrope, *H. Peruvianum*, now so common on the Hills.

EHRETIA.

Calyx 5-lobed, lobes valvate in æstivation. Corolla salver-shaped, or somewhat wheel-shaped, that is, the tube either long, cylindrical, or very shortly sub-campanulate, lobes ovate, imbricating in æstivation. Stamens 5, filaments awl-shaped, anthers ovate, 2-celled. Style filiform, 2-cleft; stigmas headed or acute; ovary 4-celled, with a pendulous ovule in each. Berry fleshy or dry, sometimes with 2 two-celled, or 4 one-celled nuts, or sometimes all united into a single 4-celled nut, seed pendulous; albumen sparing or none; embryo axile, radicle cylindrical, about as long as the cotyledons. Shrubs or small trees: leaves alternate or fascicled, entire or serrated: flowers usually corymbose: corolla white.

De Candolle describes 58 species of this genus distributed under four sections. These sections are so far dissimilar from each other, that he asks, at the conclusion of his generic character, whether the genus might not be divided into as many genera as it now has sections. I certainly cannot answer the question, but I do know that the species of some of the sections are very unlike those of the others, and, without close scrutiny, such as one would not readily suspect belonged to the same genus. The one here given is barely entitled to a place in this book, as I do not recollect of having seen it above Coonoor, and I am not quite certain of having found it even so high as that. It is introduced as assisting to illustrate the differences above adverted to, in the remarks on the order. The species, if this is indeed Roxburgh's plant, is rather widely distributed as the specimens from which the species was first named were obtained from the subalpine jungles of the Northern Circars.

Ehretia lævis (Roxb.), arborious, glabrous: leaves petioled, from oval to oblong lanceolate, acuminate at both ends, smooth, shining above: corymbs axillary, dichotomously many-spiked: pedicels and deeply 5-cleft calyx slightly hairy: corolla rotate, lobes reflexed: stamens exserted.—Leaves from 3 to 6 inches long, from 1½ to 3 broad; petiols from ½ to 1½ inches long, axils of the vein sometimes hairy or furnished with a gland: flowers subsessile, secund on the numerous circinate spikes: drupes about the size of a large pepper-corn; red when ripe.

Neilgherries, on the eastern slopes, flowering during the cool season, December and January.

TOURNIFOURTIA.

Calyx 5- rarely 4-parted. Corolla salver-shaped, throat naked. Stamens 4–5, within the tube. Stigma entire or 2-lobed. Fruit 2-carpelled, carpels sometimes undivided, the nuts 2-seeded, or 2–3-celled, sometimes 2-parted, and then four nuts are formed with one seed in each; radicle superior, short, cotyledons flat, ovate. Erect or scandent, herbs and shrubs; leaves alternate, petioled, entire, rarely, nearly opposite or sessile or serrated spikes with the flowers all turned one way, ebracteate, often cymose; corolla white or yellowish.

This, like the preceding, is a large genus, including 100 species, only 10 of which are said to be natives of India. Of these I have only seen some three or four, and have only studied two. They appear so unlike each other as to lead to the impression that they might be divided into two genera, and actually were so formerly, but are now united, showing that they cannot well be kept distinct. The one here represented I found in woods below Nedawuttim, climbing among bushes to a great extent, but only apparently in fruit, nearly every flower having become the nidus of an insect. The parts still grew, but, on cutting open the apparent fruit, they were found to contain minute caterpillars in place of seed.

TOURNEFORTIA RETICOSA (R. W.), shrubby, climbing: branches terete and with the under surface of the leaves sparingly covered with short appressed pubescence: leaves short petioled, ovato-lanceolate acuminate, acute, round at the base, dark green above, pale beneath and marked with a delicate net-work of brownish purple veins: peduncles leaf-opposed, dichotomous; branches divaricating, spikes corymbose, circinate: calyx 5-parted, lobes ovate, hispid: corolla 4 or 5 times longer than the calyx, hairy, obtusely 5-lobed: stamens 5, inserted near the base, included: fruit ——.

Western slopes of the Neilgherries, below Nedawuttim, flowering in April, and in Coorg, (Jerdon).

A large climbing shrub. One I saw was 10 or 12 feet high: leaves 4-6 inches long, about 1½ broad, sparingly sprinkled with hairs above, pubescent beneath. What I gathered as fruit proved on examination the nidus of an insect. This species seems most nearly to approach T. viridiflora, but is quite distinct, as shown at once by the comparatively large flowers and small calyx.

CYNOGLOSSUM.

Calyx 5-parted. Corolla funnel-shaped, 5-lobed, tube about the length of the calyx, throat closed with vaulted scales, lobes very obtuse. Stamens within the tube. Stigma entire or emarginate, nuts imperforate at the base, attached round the base of the style, convex or depressed, not furnished with a wing-like margin, either echinate all over, or on the margin only, at maturity separating from the base to the apex, the apex long adhering to the style. Seed hanging, cotyledons obovate, much longer than the radicle. Herbaceous plants: leaves alternate, entire: racemes often spiked, ebracteate or sometimes bracteate: pedicels one-flowered; corolla blue, purple or white.

This, like both the preceding, is a large genus, including, according to De Candolle, about 50 species, not one of which, so far as I am aware, is found in the Carnatic, though the accompanying species is common on the elevated mountain regions. On the Neilgherries it is a troublesome weed. The same is the case on the elevated parts of Ceylon. In referring it to the Nepaul species in preference to the Peninsular one, *Heynii*, I was principally guided by the description of the fruit, which, in this, is bristly all over, in that, round the edges, only with short tubercles on the centre. My impression is that they may be the same species, only slightly modified, but whether or not this be the case, further consideration now leads me to think that I would have acted more judiciously had I adopted the latter name as it seems probable that it must be that species while it may not be the one I have called it, though it agrees well with the character and description. When young it greatly resembles a *Myosotis*, and the flowers might readily be substituted for those of the Forget-me-not, as regards both form and colour.

CYNOGLOSSUM FURCATUM (Wall.), stems ramous, adpressed, pubescent or tomentose, the hairs on the lower part reflexed: leaves glaucescent, adpressed-pubescent; radical ones petioled, oval-lanceolate, acute at both ends; cauline ones sessile, the upper ones half-stem-clasping, ovato-cordate: racemes pairred, slender, ebracteate, secund, hairy.—Flowers purple, scales of the throat two-lobed.

Neilgherries, very common, rising from one to three feet high, and in flower at nearly all seasons.

This species appears very nearly allied to *C. micranthum*, from which indeed it seems scarcely to differ; I believe, however, this is the true *C. furcatum*. If I have not confounded the two species this has an extensive range of geographical distribution, extending from the Himalayas to Ceylon, and is generally to be met with in alpine regions throughout that wide extent of country.

VERBENACEÆ.

This is a large and, as it now stands in Botanical works, a highly complex order. We find among its species minute procumbent herbs and gigantic trees, flowers so minute that a high magnifier is required for their examination, and others large and showy, some delightfully fragrant, such as the garden Verbena *(V. Peruviana)* and many altogether scentless, many simply white or cream-coloured, and others deeply tinged with blue or purple. In their inflorescence and floral structure, we find the species of this order exhibiting similar variations; the flowers being capitate, spicate, cymose, corymbose, panicled or umbelled, and the ovaries with erect or pendulous ovules. No wonder Botanists have found this a difficult order to deal with, and have shown little inclination to grapple with its heterogeneous combinations. Apparently owing to this cause, Schauer's monograph in De Candolle's Prodromus seems, so far as I am aware, to be the first original composition of the kind. Walper's had already done good service in collecting together all that had been previously published, but his article differs from Schauer's in being mainly a compilation, not an autograph work, derived from the examination of original materials.

In its botanical relations, this order seems to take its place very naturally between *Borragineæ* and *Labiatæ*, the former almost passing into it at several points, while it seems nearly to pass into Labiatæ, at others, but these so delicately that it requires a Botanist to see them.

In its distribution it is more tropically disposed than either of the two orders named, a few only of its species extending so far north as Europe. In the warmer regions of Asia and America, they are most abundant, but a few are found in Africa and Australia. In India they are rather numerous, and some of them of very large size, the teak tree being, however, by far the most conspicuous, and valuable. In Bengal about Jubbulpore there is another large tree which the late Mr. Griffith has described under the name of *Hemigymnia* which he considers nearly allied to the teak, and furnishing timber of nearly equal value. Besides those there are several other large Indian trees that belong to this family, such as *Vitex alata, arboria, altissima*, all inhabiting the forests covering the slope of our higher ranges of hills. The Clerodendrons however are the most showy of our Indian Verbenaceæ, among which the one here represented is about the most conspicuous. The Indian Verbenas have but little of the fragrance of the Peruvian one now so completely naturalized in the gardens about Ootacamund. The *Clerodendron serratum* is nearly equally deserving of a place in gardens as an ornamental object, since, with a little attention to pruning and culture it might be made a truly showy plant though, in its wild state, disposed to grow tall and ungainly looking.

LANTANA.

Calyx membranaceous, small, obsoletely 3–4-toothed, ciliate, covering the fruit and, with its increase, becoming greatly extended and translucent, at length withering away (abolescens). Corolla tubuloso-infundibuliform, slightly swelling upwards; limb oblique, flat, or inclined, somewhat bilabiate, the upper lip entire or bifid, the lower one lobed. Stamens 4, inserted within the tube of the corolla, didynamous; anthers 2-celled, opening longitudinally. Ovary 2-celled, cells with a single erect ovule; style terminal, short; stigma linear or obliquely capitate. Drupe fleshy or succulent with 2 nuts, shell hard, rough, and

tuberculate, or rarely smooth. Cotyledons thick, radicle inferior, short. Shrubs or under shrubs, stems 4-sided; leaves opposite or verticelled, simple or feather-nerved, rugous; pedunclos axillary, usually single; capitula compact, usually elongating during flowering; calyx pubescent; corolla variously coloured, white, orange, red, purple and often changeable. The odour of the plants of this genus is very peculiar, something between the heavy smell of musk and a rather agreeable fragrance.

This is a large and to the Botanist most intractable genus. Schauer defines 54 species. Fortunately for Indian Botanists, only one or two are Indian. I suspect we may safely lay claim to two, if any confidence is to be placed in the colour of the flowers and fruit. The one common in some parts of the country on the plains has invariably white flowers and fruit, and is the true *L. alba*, according to Schauer, and the one here represented, which is not unfrequent on the Neilgherries below Kotergherry, which is Roxburgh's *L. Indica*. With the exception of the colour of the flower and fruit, they seem very much alike, but in the hands of a Botanist thoroughly conversant with the distinguishing features of this very natural genus, which I am not, it seems not improbable they might be found truly distinct.

The genus is one which so readily naturalizes itself, wherever it is introduced, that it is still a question with some Botanists whether the white-flowered one, which is spread all over India, is truly a native. Dr. Wallich, if I mistake not, is one of those who question its right to be considered a native. Dr. Royle I know does or at all events did believe it a truly Indian plant.

Roxburgh received his plants, corresponding with ours, from Mysore. In Coimbatore, and also in some parts of Mysore, the white-flowered one, which has also white berries, not purple like the Hill one, is very common, and very variable. Growing in open ground, it is a low spreading stunted shrub, but if among bushes or in hedges it rises to the height of 10 or 12 feet. This, I have no doubt, would in similar circumstances do the same, though I am not sure that I ever saw it assuming those gigantic proportions.

The one here represented seems well worthy of a place in gardens, and as it thrives luxuriantly in Calcutta, I presume it would do the same in Madras.

Lantana Indica (Roxb.), shrubby, straight, 4-sided, hairy: leaves opposite, cordate, serrate, rugous: pedunclos solitary, axillary, shorter than the leaves: heads ovate: bracts ovate, lanceolate: nut 2-celled. Rox. Fl. Ind.

A common plant, widely diffused over the Indian Peninsula, flowering during the rainy and cool seasons.

The plant here represented is certainly Roxburgh's, I have therefore retained his name and character. But since the plate was printed, I have received D. C. Prod. Vol. XI. in which I find it reduced to a synonyme of *L. alba* by Schauer, with the following character.

L. alba (Miller, &c.), straight, branches virgate and with the pedunclos 4-sided, rough and strigose: leaves opposite, short petioled, elliptic, or roundish, ovate, or sub-cordate; acuminate, coarsely crenato-serrate, rugous, hirto-scabrous above, whitish, villous beneath: pedunclos axillary, rigid, spreading, thickened above: capitula hemispherical, spicato-elongated: bracts ovato-roundish or elliptico-ovate, acuminate, half the length of the corolla, exterior ones involucrate, foliaceous, spreading.

This is a variable plant, seen growing on the open ground, it is a low, spreading, procumbent shrub, but if near support, in hedges or among bushes, it often attains the height of 6 or 8 feet, and is then one of considerable beauty on account of the profusion of its heads of pure white flowers.

On the higher slopes of the Neilgherries, the flowers are usually coloured, and look so *different from* the plant of the plains, that one is almost led to doubt their identity, but on comparison, I could not discover specific marks by which to distinguish them.

CLERODENDRON.

Calyx campanulate, rarely tubular, sometimes 5-angled, or somewhat inflated, 5-cleft or toothed, seldom truncated. Corolla funnel-shaped or somewhat salver-shaped, tube usually conspicuously exceeding the calyx, sometimes very long; limb five-parted, the two upper divisions a little larger. Stamens 4, inserted on the tube of the corolla, much exserted, sub-didynamous; anthers 2-celled, cells parallel opening longitudinally. Ovary 4-celled, cells with one pendulous ovule: style filiform, exserted; stigma 2-cleft, acute. Drupe within the enlarged, persistent calyx, baccate, 4- or by abortion 1-seeded, usually 2-4-lobed, nuts woody, smooth. Seed solitary, pendulous, cotyledons oily, radicle short, inferior. Shrubs, or small trees, leaves opposite or ternate, simple, entire, or rarely lobed: cymes trichotomous, axillary or collected into a terminal panicle.

Of this genus, Schauer enumerates 87 more or less perfectly described species, and 5 Indian ones of which he only knows the names. Forty-nine of these he had either examined or had no doubt about; of

23 be felt somewhat uncertain, and marked as species requiring further examination, and the remaining are said to be "species dubiæ," meaning by that, many of them are probably described under other names, but which he cannot with certainty ascertain for want of specimens. Of the 92 species named, 34 are from India, and about half the number from the Eastern Islands and China; Australia, Africa and America contribute the rest. Many are plants of great beauty, and are prized as conservatory and hot-house plants in English collections, and several have been figured in English Botanical periodicals.

Some of the species are remarkable for the very heavy disagreeable odour their leaves give out when bruised, somewhat similar to that of the well-known green-bug of India. The C. INERME which is, or used to be, employed as a substitute for the Privet, as an edging for garden walks about Madras and elsewhere near the coast, partakes of this quality in a very marked degree. In addition to the *C. serratum*, there is another with pretty large white flowers, not uncommon on the Hills about Coonoor and the slopes below that station, called *C. infortunatum* in allusion to some supposed unhappy property. The name *Clerodendron* means literally Fate-tree—hence we have among its species the curious specific names of *C. fortunatum*, *C. calamitosum*, *C. infortunatum*, though there is no reason to believe them better or worse than their neighbours. We have again among its species, *C. fragrans* and *C. putre*, the latter being described as a "planta fœtidissima." One of the Indian species is said to be used medicinally by the Natives but I do not know for what purpose.

In regard to the extent of its geographical distribution, *C. serratum* is remarkable, Nepaul, Silhet, Assam, Java, Ceylon, and generally over the Peninsular mountains.

CLERODENDRON SERRATUM (Sprengel), ramuli quadrangular, furrowed, and with the leaves glabrous: leaves opposite or ternate, chartaceous, short petioled, ovate, oblong or even lanceolate, cuniato-attenuate, entire at the base, acuminate, remotely mucronato-serrato-dentate, somewhat shining above, pale beneath: panicles terminal, raceme-like, whitish, from mealy pubescence: lower bract, and bracteoles foliaceous, pale, membranaceous, acuminate, bracts ovate, roundish, bracteoles lanceolate: cymes two or three times trifid, loose: calyx cup-shaped, sub-truncated, very shortly 5-toothed: tube of the corolla cylindrical, more than twice the length of the calyx.

A rather common plant, in shady woods and sub-alpine jungles. Abundant on the Neilgherries, and there growing in open pasture ground, a very conspicuous object.

The leaves are deep green, the flowers blue, deeper at the apex, becoming paler downwards, sometimes with a considerable tinge of rose, which adds greatly to the beauty of this already handsome plant. The shrub varies from one to six feet in height, rarely so low as the first, or higher than the last.

GMELINA.

Calyx cup-shaped, 4–5-toothed, persistent, somewhat enlarged with the fruit. Corolla tubular at the base, greatly enlarged at the throat, ventricosely bell-shaped; limb spreading, bilabiately 4–5-lobed, the anterior one larger, inflexed in æstivation. Stamens 4, didynamous, ascending, scarcely exserted; anthers 2-celled, attached by the middle, cells distinct, opening longitudinally. Ovary 2–4-celled, cells 1-ovuled; style filiform; stigma equally bifid. Drupe baccate, nut solitary, berry smooth, 4-celled, perforated at the base. Seed pendulous radicle inferior. Shrubs or sometimes large trees, branches usually thorny: leaves simple, opposite, entire or lobed; inflorescence cymoso-paniculate, panicles raceme-like or composed of short few-flowered decussating cymules, or simply racemed; bracts often caducous; corolla conspicuous. Drupe large, oblong.

This is a small genus of some 10 or 11 species, only 7 of which are defined in Schauer's monograph. Since its publication, Sir W. Hooker published one, I believe the one here represented, under the name of *G. Rheedii*, accompanied by a figure. I have seen neither the figure nor description and therefore cannot state his reasons for considering it distinct from Roxburgh's *G. arborea*.

When I published the accompanying plate in the Icones, I was, as will be seen by the remarks appended to the specific character which accompanied, of opinion that the Malabar plant was not distinct from the Bengal one. I am now quite satisfied that they are different species and most easily distinguished, so easily that I now almost wonder how I then overlooked the palpable difference, even though the same specific character, with the exception of a single word might serve for both. That exception is found in the corolla. In Roxburgh's plant it is 4-lobed with the larger anterior one emarginate, in ours it is 5-lobed with the larger lobe entire. But for this difference of structure, I should have hesitated to consider them

distinct, but aided by this character, which is shown in Rheede's plate, I can have no hesitation in adopting Sir William's name, and accordingly request that the name on the plate be changed from *G. arborea*, Roxb., to *G. Rheedii*, Hooker.

In transcribing the generic character from Schauer, I have taken the liberty of making some alterations. I have introduced into mine the æstivation of the corolla, not alluded to by him. Again I have allowed it a 4- or 5-lobed bilabiate limb, and in place of "seed erect" have said "seed pendulous, radicle inferior" which they really are, being attached to the apex of the cell. I do not understand the principle on which he allows pendulous ovules and erect seed, the attachment of both being the same, unless it be on the theoretical one, that an inferior radicle constitutes an erect seed, however attached. If this is the view on which that mode of expression rests, it seems an erroneous one, as in description facts, not theories, ought to be given, and therefore "radicle inferior" would have been better, as stating clearly what is the case, whereas to call a seed erect which is evidently pendulous, unless guarded by previous explanation, must tend to mislead.

GMELINA RHEEDII (HOOKER. *G. arborea* Roxb. R. W. Ic. No. 1470) arboreous, unarmed, ramuli and young leaves covered with a greyish, powdery tomentum: leaves long, petioled, cordate or somewhat produced and acute at the base, acuminate, the adult ones glabrous above, greyish tomentose beneath, with 2–4 glands at the base: panicles tomentose, axillary and terminal racemes-like; cymules decussate, trichotomous, few-flowered: bracts lanceolate, deciduous: the acutely dentate calyx, eglandulose.

A small tree, not unfrequent in the Paulghaut jungles, and generally distributed in Malabar.

The drawing was made from a specimen obtained near Coonoor on the Neilgherries, and seems to correspond sufficiently with both Roxburgh's figure and description. I advert to this, as I understand Sir W. Hooker has made a new species, under the name of *G. Rheedii*, of what I suspect can at best be viewed as a variety of this species, that is, he views the plant he figures and describes as identical with Rheede's Hort. Mal. 1 tab. 41, but as having no affinity with Roxburgh's Cor. Plants, tab. 246. As I have not seen either his figure or description, and have only portions of Roxburgh's and Rheede's figures, copied from the originals, not the entire plates to compare, I am not in a position to offer an opinion on Sir William's views, but on comparing my specimens with Roxburgh's description, can see no reason to doubt their belonging to the same species, though there be considerable discrepancy between their leaves and those of Roxburgh's plant, as shown in his plate. The differences however are not such as I think ought to have specific value attached, if the other characters correspond, the more so, as I find among my specimens intermediate forms connecting the two extremes, and showing that they belong to the same species, and thence that such slight differences in the outline of the foliage can scarcely be admitted as of itself affording a sufficient specific mark.

LABIATÆ.

This, after Compositæ and Leguminosæ, is the largest order of dicotyledonous plants, including upwards of 2500 species, and is to the full as natural as the former. Such being the case, its distinctive characters are few and very explicit. In the words of Mr. Bentham, its great Historian, "The order of *Labiatæ* is one of the most natural and distinctly-marked of all. The opposite leaves, monopetalous corolla, 2 or 4 stamina, and the free 4-lobed ovarium; are characters so easily observed and so constantly accompanying the general habit of the whole series, that, from the time of Linnæus to the present day but two or three genera have been improperly associated with or separated from it." He adds, "its immediate affinities are but few." So truly is this the case that it may almost be said to be isolated and stand apart from all the orders of its class. Those to which it most nearly approaches are *Verbenaceæ* and *Borragineæ*, but still it can scarcely be confounded with either. One genus only, consisting of a single species, seems to fluctuate between this and *Verbenaceæ* and, that owing rather to the plant being imperfectly known (from want of perfect seed), than to the difficulty of drawing the line between well-known plants. In a linear series this order unquestionably occupies one end, for, while *Verbenaceæ* may perhaps be said to pass into it through *Holmskioldia*, it passes into no other. In some respects, *Borragineæ* are allied, but in all others they are amply

distinct.

The order is made up of the plants commonly known under the names, Basel, Mint, Marjorum, Thyme, Lavender, Sage, Rosemary, Hyssop, Balm, and many others, some or all of which must be familiar to nearly all readers. Its species are distributed all over the world, from Melville Island to Terra del Fuego, but most abound in temperate regions, which tends to account for their frequency on these mountains, and generally on elevated alpine regions throughout India. Of about 200 species named in Wallich's list of Indian plants a large proportion were obtained from the Himalayas and Northern Provinces. A few only are natives of the plains of India but some of these are certainly endowed with the property of enduring a high temperature.

Being thus alpine in its habits, I have devoted a larger number of plates to the illustration of this family than to any of its neighbours, though they too are sufficiently interesting.

Botanically considered, this, next to *Compositeæ*, is one of the most difficult families with which the Botanist has to grapple, for, being so exceedingly natural, every genus seems imperceptibly to pass into its next neighbour and even the species seem to be almost indefinable, forms of one passing into another by such insensible gradations that one is often disposed to reduce two or three into one, for want of sufficiently tangible distinctions by which to keep them distinct. For myself I often felt inclined to do so, on the supposition that some of them must have been taken up from solitary specimens of varying forms, or from indifferent or bad specimens. Such a proceeding, however, ought always to be avoided, unless based on the clearest evidence, and supported by reference to, and comparison with, authentically-named specimens, which are seldom available in India, where there are no herbaria.

This cautious course it is desirable to follow at all times, but especially while studying families so truly natural as the Labiatæ, and those who wish to form collections, either for their own use or for friends, should make a point of preserving a considerable number of specimens of each species, and, when possible, selected from several individuals of the species, as affording the probability of securing nearly all the varying forms it is likely to present.

As regards the properties of this extensive order much might be said, as so many of them are highly aromatic and appropriated in so many ways to supply the wants, or provide luxuries for the benefit of mankind, but it is not my intention to expatiate largely on this branch of the subject, simply because, so few if any of the native species of the Neilgherry ones are so appropriated. As, however, many of the most useful are already or might easily be introduced, I cannot altogether pass the subject in silence, and shall therefore devote a few lines to its consideration.

When the leaves, &c., of a labiate plant are closely looked at they will be found to contain numerous little reservoirs of oil which, when bruised, for the most part give out a fragrant aromatic smell, and communicate to the tongue a pungent sensation and aromatic flavour. It is in this oil that the properties of these plants principally reside. Hence their aromatic properties, and hence also, their being generally destitute of any deleterious qualities. Some, however, are said to combine tonic and astringent powers in addition, and as such have been beneficially prescribed in cases of indigestion and looseness consequent on imperfect assimilation of food, and also in cases of low fever, proceeding from debility. But their principal medicinal use is as carminitives in flatulent colic, for which purposes various species of mint are greatly in repute. Peppermint is

much esteemed in such cases, but Spearmint and Pennyroyal are also in great request at Home, hence the frequent use of mint tea by invalids, especially in the country, where domestic medicine is much resorted to. Lavender oil, obtained from the *Lavandula vera*, is also in great esteem. It forms the basis of the well-known Spirits of Lavender. Of the very numerous species of sage, only one or two seem to be used medicinally, namely, the officinal or garden sage. The Indian sage, which has similar properties, has been separated to form a distinct genus, under the name of *Meriandra*. It grows freely at Ootacamund, and might be cultivated to any required extent as a substitute for the true garden sage. The Rosemary is another plant deserving attention. In medicine it has been employed as a cephalic, for the relief of headache, but is principally remarkable for its power of promoting the growth of hair, "it is in fact what causes the green colour of the best pomatums used for that purpose," Lind., and an infusion of it keeps the hair in curl during damp weather. The patchouli or Pucha-pat, of which large quantities are exported from Penang for stuffing mattresses and pillows, is a species of *Pogostemon*. Its strong smelling leaves are supposed by the Natives to keep off contagion and prolong life. It is now largely consumed in Europe. The Horehound *(Marrubium vulgare)* is a popular and useful remedy at Home, for coughs and more severe forms of cold, by restoring the tone of the stomach and allaying irritation: for these purposes it is prescribed in form of infusion and lozenges. The *Prunella vulgaris*, a native of the Hills, is prescribed in domestic medicine as a febrifuge. Of the Indian Labiates the *Ocima* or Basils are used for similar cases as those for which mints are prescribed in Europe. The most extensive consumption, however, of the plants of this family is not medicinally, but in cookery, under the name of "sweet herbs," for flavouring cooked dishes and sauces, and in perfumery, while many are cultivated for their beauty as garden ornaments, especially the sages.

PLECTRANTHUS.

Calyx campanulate, 5-toothed, teeth equal or the upper one larger; enlarging with the seed and then declining, straight, incurved, or inflated with the teeth equal or variously 2-lipped, sometimes erect, tubular, or campanulate, equally 5-toothed. Tube of the corolla exserted gibbous above the base, or calcarate, then abruptly declining (declinato-refracto) or nearly straight; throat equal or rarely inflated, the upper lip 3–4 cleft, the lower one entire, often longer concave. Stamens declinate, didynamous, the lower ones longer; filaments free edentulate; anthers ovate, reniform, cells confluent or rarely somewhat distinct, divaricate; style 2-cleft at the apex, lobes about equal, subulate, with minute terminal stigmas. Herbs, undershrubs, or shrubs. Racemes terminal, simple or ramous; verticillasters lax, many-flowered, usually producing cymes on each side, rarely contracted into dense verticillasters. Benth.

The essential character of the genus is comprised in these few words:

"Inferior lobe of the corolla elongated, concave. Calyx of the fruit dentate, not spiny, mouth open. Filaments free." By this last mark it is distinguished from Coleus, which it sometimes much resembles, in which the filaments are united, or monadelphous, at the base.

This is a genus of great extent, including, as it now stands in De Candolle's Prodromus, 65 species, natives, of Asia, Australia, and Africa, one only having as yet been found in America. It is a very natural genus and the species, assuming that they are all good, run so much into each other as to render their discrimination often exceedingly difficult, hence, giving rise to the suspicion that some at least, are but varieties. The one here represented is very abundant in some places on the Hills, usually selecting low moist ground on the banks of streams; it is, if possible, still more common on some of the higher ranges of the Pulney mountains. In such situations, when sheltered by adjoining woods, it often grows to the height of 5 or 6 feet. The

flowers are too small to attract the notice of cursory observers, but when looked into with the aid of a magnifier are not deficient in beauty, being finely speckled with red spots, on a white ground. The calyx, too, is spangled with bright resinous glands. The specimen represented is, for the convenience of space, taken from a small plant, or may be merely a side branch. The figure in the upper corner is the tip of a branch further advanced to give some, though an imperfect, idea of what the plant becomes when every branch has become similarly developed.

I have not heard of this plant being applied to any useful purpose, but, as it possesses the usual properties of the family, I imagine some use might be found for it. The scent it exhales is so strong that I have heard it represented as quite overpowering. I was not myself sensible of this effect which therefore must be attributable rather to individual sensitiveness to strong smells than to any peculiarity of the scent.

PLECTRANTHUS WIGHTII (Benth.), herbaceous, erect, ramous: leaves petioled, broadly ovate or rounded, acuminate, cordate at the base, smooth on both sides or pubescent; the inferior floral ones conformable; the superior ones and bracts membranaceous, rotundato-spathulate, shorter than the peduncles and pedicels: panicles very ramous, many-flowered: fructiferous calyx declinate, oblong, incurved, striated, glabrous, with the mouth obliquely bilabiate: the teeth nearly equal, ovate: stamens exserted.—Leaves from one to two inches long or, on young, luxuriant plants, larger, usually longish, acuminate; serratures obtuse or acute: panicles large, loose: flowers white, speckled with red points, tube of the corolla about as wide as long, the upper lip ascending, 4-lobed, each lobe marked with two red spots at the base, the inferior narrower, longer, concave. Stamens free, exserted.

Neilgherries and Pulney Mountains, frequent, flowering during the autumnal months. The small size of the flowers prevents this from becoming the garden favourite which it deserves to be. The specimen selected by the draughtsman is rather too young to furnish a correct idea of the specific characters. It is distinguished by Mr. Bentham from *P. scrophularioides*, on the one side, and *P. strictus*, on the other, but with an extensive series of specimens before me, from different stations, and authentic specimens of all the three species to compare, I find I cannot unravel them.

ANISOCHILUS.

Fructiferous calyx ovate, suberect, the base or middle inflated, contracted above; limb either bilabiate, the upper lip incumbent on the truncated lower one, closing the calyx, or obliquely 5-toothed, the upper one longer, incurved or incumbent. Tube of the corolla slender, abruptly bent beyond the calyx, throat dilated, upper lip short, obtuse, 3–4-cleft, the lower one elongated, concave. Stamens 4, filaments free, edentulate, style subulate at the apex, equally bifid. Hypogynous disk lobed, the posterior lobe often higher than the ovaries. Herbs or (undershrubs?) verticillasters, densely imbricated, forming ovate, oblong, or cylindrical spikes. Floral leaves bract-like, caducous, shorter than the flowers, or rarely the upper ones longer, forming a terminal tuft.

ESSENTIAL CHARACTER.—Lower lobe of the corolla elongated, concave, upper lip of the fructiferous calyx incumbent on the lower, or the inflexed teeth closing the mouth.

Of this genus Mr. Bentham describes eight species, six of which are natives of the Indian Peninsula. The following species are not among them. This addition raises the number to ten, but certainly does not take all in, there being still one or two undescribed species in my collection. As in most of the other genera of this order, their discrimination is very difficult, partly owing to the striking family likeness which runs through the whole, and partly to their liability to run into variations according to the kind of soil in which they happen to grow. The grand distinguishing feature of the genus, is the dense inflorescence and the peculiar way in which the mouth of the fructiferous calyx is closed with the deflexed upper lip. Where these occur, there can scarcely be any hesitation in regard to the genus. The species, as already said, are not always so easily made out.

ANISOCHILUS PURPUREUM (R. W.), stem procumbent at the base, branches ascending or erect, sericeo-villous: leaves petioled, obovato-spathulate, obtuse or sub-orbicular, entire, fleshy: spikes axillary and terminal, peduncled: bracts lanceolate, acute, pilose, about the length of the calyx: flowers purple, corolla marcescent, tubular, 2-lipped; upper 4-lobed, erect, under entire, deflexed: stamens exserted: under lip of the fructiferous calyx minute, upper larger, deflexed, 3-toothed.

Neilgherries, on the eastern slopes, about Coonoor, on large stones covered with vegetable earth, flowering February and March.

The specimen selected by the draughtsman is defective, as not showing the general habit of the species, which is usually, but not always, procumbent, with

ascending or erect branches. The specimen is evidently an erect branch of a very luxuriant plant. This is perhaps too nearly allied to the following, but I have kept them distinct, partly on account of the difference of colour of the flowers, purple in this, white in that, and partly on account of the unusual feature of the marcesent corolla in this, deciduous in the other.

ANISOCHILUS SUFFRUTICOSUM (R.W.), suffruticose, erect, ramous, young shoots and leaves densely villous: leaves short, petioled, ovate, lanceolate, prominently veined beneath, when dry deeply reticulated between the veins: spikes numerous, long, pedunculed, congested on the ends of the branches: corolla tubular, deflexed from the base, 2-lipped; upper lip 3-lobed, the middle lobe larger, emarginate, under entire, obtuse: stamens the length of the corolla: under lip of the fructiferous calyx minute, upper much larger, entire, round at the apex, deflexed.

Sisparah, on the western slopes of the Neilgherries, on rocky cliffs, among long grass, flowering December and January. Stems apparently annual, from two to three feet high, but the roots seem perennial, as old, withered plants were noticed with young shoots at the base.

POGOSTEMON.

Calyx ovato-tubular, equal, 5-toothed, throat naked within. Tube of the corolla inclusa, limb 4-cleft, sub-bilabiate, the upper lip trifid the inferior one entire, all the lobes quite entire, about equal, spreading. Stamens four, exserted, straight or somewhat declining; filaments bearded about the middle or naked; anthers terminal, one-celled opening transversely, style equally bifid at the point, lobes subulate. Herbs (or under shrubs?). Leaves opposite, petioled or entire, dentate or somewhat lobed; verticillasters many-flowered, equal or somewhat secund, sometimes glomerato-spicate supported by bracts, the spicules racemoso-paniculate, sometimes loosely approximate in spike-like racemes.

ESSENTIAL CHARACTER. Anthers from the first 1-celled, sub-globose. The three upper lobes of the corolla approximated, the lower one declining. Stamens sub-declinate.

Of this genus 30 species are enumerated, 23 of which are natives of India, and several of the remainder from the Eastern Islands. Of the Indian ones five or six are natives of the Neilgherries. The two here given represent two distinct forms, one has naked the other bearded stamens, and one has glomerate verticillasters the other spike-like racemes, but in both the lower lip of the corolla is scarcely distinct from the upper.

To this genus belongs the Putcha-pat before alluded to, as being so much prized, as a scent, among Natives, especially Mahomedans and more recently in Europe.

The following account of the properties and uses of that plant I extract from a paper by Dr. Pereira published in the Pharmaceutical Journal for August 1844.

"Under the name of *Patchouli* or *Pucha-pat*, are imported into this country" (only within these seven years, as Mr. Ellis informs us) "the dried foliaceous tops of a strongly odoriferous plant, called, in Bengalee as well as in Hindee, *Pucha-pat*. On the 27th of June, 1844, Mr. Ellis, drug-broker, of Fenchurch-street, put up for sale, at Garraway's Coffee-house, forty-six cases of this substance. Some of the packages consisted of half boxes, containing 50lbs. each, others of whole boxes holding 110lbs. each." (It was considered enough for ten years' consumption!) "The price asked was six shillings per pound, but there were no biddings. This lot came from New York, to which place it was said to have been carried from China. The dried tops imported into England are a foot or more in length. The odour is strong and peculiar; I cannot call it agreeable, though some others do, while many persons regard it as disagreeable. It is somewhat analogous to that of *Chenopodium anthelminticum*. The taste of the dried plant is very slight. By distillation it yields a *volatile oil*, on which the odour and remarkable properties depend. In Europe it is principally used for perfumery purposes. *Sachets de Patchouli* are sold in the shops. They consist of a few grains of the coarsely-powdered herb, mixed with cotton-wool, and folded in paper. Placed in drawers, chests, &c. they are said to drive away insects from linen, shawls, &c. An *Essence de Patchouli* is used by perfumers, principally for mixing with other scents in the preparation of compounded perfumes: for this purpose it is considered very useful. In India it is used as an ingredient in tobacco and for scenting the hair of women."

"An ingenious writer, in the Gardener's Chronicle (1840, p. 645), on the odours of plants, remarks—'It has been said, by an eminent French perfumer, that the odour of *Patchouli* was a 'disgrace to the art;' such, however, is the result of fashion, that a year or two ago no lady of *ton* was perfect unless she was enveloped, as it were, in the fragrance of this plant, the odour of which is very

mouldy, or earthy smell—not very enticing, certainly, by description, and much less so in reality. The characteristic smell of Chinese or Indian Ink is owing to an admixture of this plant in its manufacture. In the vegetable world it is the most permanent of odours. The origin of its use is this. A few years ago, real Indian shawls bore an extravagant price, and purchasers could always distinguish them by their odour; in fact, they were perfumed with *Patchouli*. The French manufacturers at length discovered this secret, and used to import this plant to perfume articles of their make, and thus palm off home-spun shawls for real India!"

Neither of the species here represented nor indeed any of those I recollect growing on the Hills quite accords with the true Putcha-pat but *P. rotundatum* is that which comes nearest, and I think it probable that some one of the 4 or 5 species indigenous on the Neilgherries will be found, on trial, imbued with its peculiar fragrance.

Of course it will be necessary to dry the plant, and I fancy by exposure to the sun, as hay is dried, to bring it out.

POGOSTEMON ROTUNDATUM (Benth.), villous, stem ascending: leaves roundish, doubly crenate, truncated or cordate at the base; the upper floral ones shorter than the calyx: racemes simple, verticillasters equal, distinct (sub-remotis): bracts linear subulate: teeth of the calyx lanceolate, villous: filaments bearded.

Neilgherries, frequent about the outskirts of woods, and in neglected, broken ground, flowering most part of the year, but in greatest perfection during March and April.

A low growing plant, somewhat spreading at the base, afterwards ascending, leaves softly villous, racemes 2 to 6 inches long, compact towards the apex, flowers small, white.

POGOSTEMON SPECIOSUM (Bentham), piloso-hispid; stem erect: leaves broad, ovate, cordate at the base, doubly crenate: racemes simple: verticillasters terete, loosely approximated: bracts minute: teeth of the tubular, nearly glabrous, calyx subulate: filaments naked.

Common about the outskirts of woods, on the Neilgherries, usually in moist soil, flowering during the rainy and cold season.

MICROMERIA.

Calyx tubular, 13 or 15 striated, 5-dentate, teeth about equal, straight or scarcely 2-lipped, throat usually villous within. Tube of the corolla equal, straight, naked within, usually shorter than the calyx; limb 2-lipped, upper lip erect, entire, or emarginate; lower one spreading, 3-lobed, lobes about equal, or the middle one broader, entire, or emarginate. Stamens 4, didynamous, the inferior ones longer, ascending arcuato-connivent at the apex, shorter than the corolla or rarely exserted: anthers 2-celled, the connectivum often thickened, cells diverging or at length devaricate, connective adnate. Lobes of the style sometimes equal, subulate, sometimes the upper one shorter the lower elongated, recurved, flattened. Nuts dry, smooth. Under shrubs or herbs; verticillasters axillary or spicate, rarely cyme-like or sub-panicled. Flowers usually small, purplish or white.

This is a large genus including, according to Mr. Bentham's list, 59 species, only two of which are natives of India, the one here represented and another found by Dr. Falconer on the banks of the Hydaspes. Our one has a very extensive geographical range, the Himalayas from Mussooree to Khasya, Arabia Felix, Abyssinia, Southern Africa, near the Cape, and the higher mountain ranges of Southern India and probably Ceylon. The species is interesting to Europeans in India, from its striking resemblance to the wild thyme of Europe, a resemblance which, in the first instance, led to its being described under that name. It is very common on the Hills.

MICROMERIA BIFLORA (Bentham), suffruticose, very ramous, cæspitose, branches ascending, pubescent or pilose: leaves sessile, ovate, acute, flat or revolute on the edges, rigid, glabrous, subcordate at the base; the superior ones shorter than the flowers: verticillasters loose, few-flowered: braits equalling the pedicels: calices pedicelled, sub-secund, delicately pubescent, or slightly pilose; throat villous within.

Very common on the Neilgherries, and always in flower.

A low growing, very branchy plant, forming dense tufts of matted branches, from 4 to 6 or 8 inches long, the extremities thickly covered with its small, ovate, translucent-dotted leaves, from among which its numerous, pale-reddish, blue or pink flowers project. Calyx strongly ribbed; segments acute. Corolla nearly twice the length of the calyx, obscurely 2-lipped, the upper one emarginate, scarcely larger than the three lobes of the lower. Stamens incluse, anther cells divaricated. Achænia seated in a cup-shaped disk.

PRUNELLA.

Calyx tubuloso-campanulate, irregularly, about 10-nerved, and reticulately veined, flat above, bilabiate, the upper lip broad, truncated, shortly 3-toothed, the lower one half bifid with the lobes lanceolate, throat naked within. Tube of the corolla large, sub-exserted, ascending, within, near the base, annulate with scales or hairs; upper lip erect galiate, somewhat keeled above, entire, the lower one 3-lobed dependent, the lateral lobes oblong, deflexed, the middle one rounded, concave, crenulate. Stamens exserted, filaments edentulate at the base, glabrous, shortly bidentate at the apex, the lower tooth bearing the anthers: anthers approximated by pairs under the upper lip, free, two-celled, cells distinct divaricated. Gynobase equal, straight. Style glabrous, bifid at the apex, lobes subulate. Nuts oblong, dry, smooth. Herbaceous plants, verticillasters 6-flowered, densely spicate. Floral leaves bract-like, orbiculate, persistent, equaling the calyxes and imbricated with them.

This, though a small genus, is interesting owing to the almost unlimited distribution of the species here given. It seems to be found everywhere, but in Southern India only on the Neilgherries—Europe, Africa, Asia, America, and Australia, all have it. In Northern India several stations along the line of the Himalayas are indicated, but the Neilgherries, so far as I am aware, is the only one in the south.

This genus was originally called Brunella, derived from the German word *brune*, pronounced as if written *prune*, hence it got changed to Prunella, which it has retained for nearly a century. The younger De Candolle has, to my mind most unnecessarily, restored the old orthography thereby creating some confusion which might as well have been avoided, since nothing is gained to science by the change. The word Brune, is the German name of a kind of inflammatory sore throat for the cure of which the infusion and expressed juice were considered efficient remedies, whence the name Brunella, pronounced like prunella.

PRUNELLA VULGARIS (Linn), leaves petioled, ovate or oblong, entire, dentate, or incise-pinnatifid: teeth of the upper lip of the calyx truncated, aristate, or sub-muticous, or rarely sub-lanceolate: corolla from a half to twice as long as the calyx.

A very common plant by road sides, and in pastures on the Neilgherries.

This is a very generally distributed plant, being, in the language of Mr. Bentham, found "fere in toto orbe terrarum," and is introduced here as a rare example of a plant so universally diffused.

LEUCAS.

Calyx tubular or tubuloso-campanulate, striated, straight or recurved at the apex, mouth equal or obliquely elongated either above or below, 8- or 10-toothed. Tube of the corolla within the calyx, annulate or naked within, limb bilabiate, the upper one concave, erect, entire or rarely emarginate, very hairy above, the lower one longer, spreading, trifid, the middle lobe the largest. Stamens under the helmet ascending: filaments naked or sometimes pubescent at the base; anthers under the upper lip approximated by pairs, somewhat 2-celled, cells divaricating, confluent. Upper lobe of the style very short, inferior, subulate. Nuts 3, angular, obtuse. Herbs or undershrubs; leaves entire or dentate, the floral ones conformable; verticillasters sometimes few, sometimes densely many-flowered; corolla usually white, rarely purplish.

This is a large genus, including 48 species, 41 of which are natives of India. Of these 41, ten or twelve, possibly more, are natives of the Neilgherries. A genus so pre-eminently Indian and alpine ought, I believe, to have been more liberally illustrated in this work, but want of space prevented. Two of the Neilgherry ones I have ascertained to be mere variations of one species, there being no appreciable difference between *L. helianthemifolia* and *ternifolia*, all the others are, I believe, good species. The species of the genus are very generally distributed over India, and are every where to be met with from the Himalayas to Cape Comorin. One, *L. Zeylanica*, is used as a remedy against eruptive diseases by the Natives, but generally they are little thought of and present too weed-like an appearance to be admitted into gardens, though some are not devoid of beauty. In habit they so much resemble each other, that on any one species being well known, almost every other may be recognized as a member of the genus. This was one reason for my giving only a single plate to so large a genus.

LEUCAS (ASTRODON) SUFFRUTICOSA (Benth.), branches rufo-villous, leafy at the base: leaves sessile, oblong, lanceolate or linear, entire, green, hispid above, whitish tomentose beneath: bracts subulate: calyx rufo-villous, mouth truncated, teeth short, spreading.

Common in pastures on the Neilgherries.

A low plant, from 8 to 12 inches high, readily distinguished by the leafy base and long, rusty-coloured, almost naked branches, ending in 1 or 2 capitate verticillasters. Flowering during the autumnal months.

TEUCRIUM.

Calyx tubular or campanulate, rarely inflated, 5-toothed, teeth equal or the upper one often broader. Tube of the corolla short, exannulate within, the 4 upper lobes of the limb about equal, or the upper ones longer and broader, sometimes oblong, declining, sometimes very short, nearly erect, the lower one large roundish or oblong, often concave. Stamens 4, protruding between the upper lobes, didynamous, the inferior pair longer: cells of the anthers confluent. Style equally bifid at the apex. Nuts in most of the species coarsely reticulato-rugose, in a few however with the reticulations scarcely elevated, in all obliquely attached by the interior side of the base. Herbs or under shrubs variable in habit and inflorescence.

This very large genus, including 91 species, only furnishes six Indian ones, and this is the only one that occurs so far south. Mr. Bentham alludes to a specimen from the Neilgherries in DC.'s herbarium as apparently appertaining to his *T. Fortunii*, a Chinese plant; I cannot however suppose that specimen different from the plant here represented, and, judging from the character only, I should suppose the Chinese plant not specifically distinct from this. This plant is common and abounds in the wood above Belle Vue house (formerly Kelso Cottage), flowering in December and January. Possibly this may not be the true *T. tomentosum* but I see no very obvious difference between it and specimens so named by Mr. Bentham. On this however I do not lay much stress, for I had not the character of the new species before me when naming it, and the two being very like, I might easily have overlooked as mere variations, good specific characters. But to enable those who may take an interest in the question to determine the point for themselves, I give the characters of both species for comparison with the Neilgherry plant. On recomparing the specimens while writing these notes I find the difference of aspect sufficiently marked to give rise to strong suspicions that this plant is not the true *T. tomentosum* while it seems to accord well with the character of *T. Fortunii*. The differences are such as almost to satisfy me that *T. Fortunii* is a good species, a point on which Mr. Bentham seems still to entertain doubts.

TEUCRIUM TOMENTOSUM (Heyne), suffruticose, erect, branches tomentoso-pubescent: leaves ovate, rounded at the base, villous above; tomentoso-pubescent, whitish beneath, or rarely sub-glabrous: racemes paniculato-ramous: calyx declinate, pilose, bilabiate, the upper tooth broadest.

Neilgherries, abundant on the hill behind Kelso Cottage, in poor, arid soil. Flowering after the rains.

A sufficiently conspicuous plant, from the almost naked, sterile soils in which it luxuriates, attaining in such places, from 1 to 2 feet in height and, under the shade of trees, is even higher than that. The leaves are of a pale green colour, and acquire a whitish hue from the white pubescence with which they are clothed: flowers pale rose-colour, or sometimes nearly white.

TEUCRIUM FORTUNII (Benth.), herbaceous, erect, branches rough: leaves short petioled, ovate or oblong serrulato-crenate, cordate at the base, wrinkled, villous, whitish or yellowish beneath: racemes ramous: floral leaves ovate, scarcely longer than the pedicel: calyx declining, sub-bilabiate, upper tooth broader, rough, tube of the corolla equaling the calyx. CHINA.—FORTUNE. This species as regards foliage, clothing and calyx appears allied to *T. quadrifarium*, as regards inflorescence to *T. tomentosum*. A specimen in DC.'s herb. From Perrottet gathered on the Neilgherries, seems to belong to this species. This species is distinguished by its hairyness, its wrinkled leaves, and its small bract-like floral leaves. It however demands further examination.

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Clematis Spuriana (Kuad)

Clematis Gouriana (Roxb.)

Clematis Wightiana / Wall.

Anemone Wightiana (Wall.)

Ranunculus Wallichianus (W. & A.)

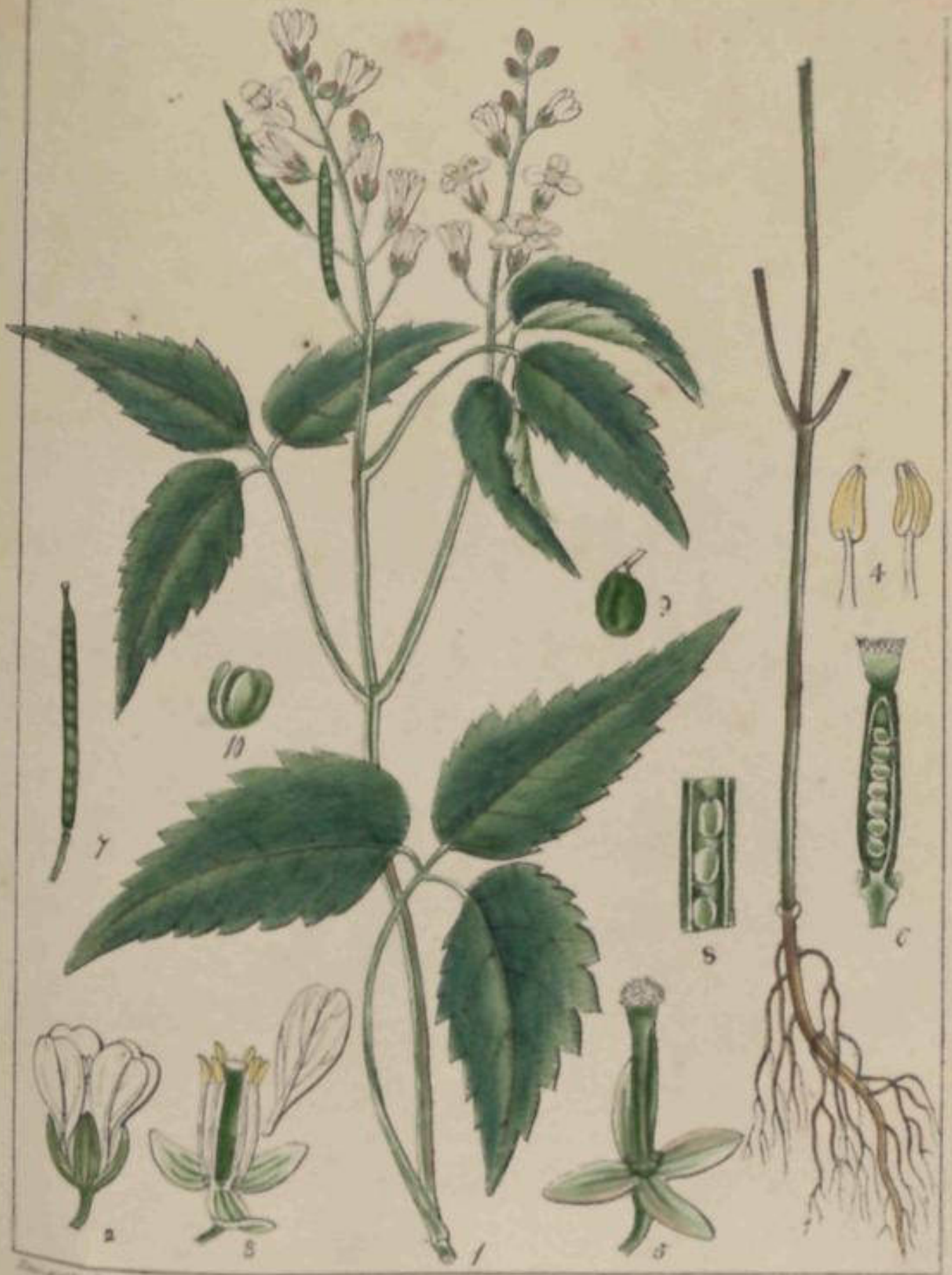
Michelia Nilagirica (Zenker)

Cissampelos hernandifolia (Wall.)

Berberideae

8

Berberis Leschenaultii (D.C.)



Cardamine Bonariensis

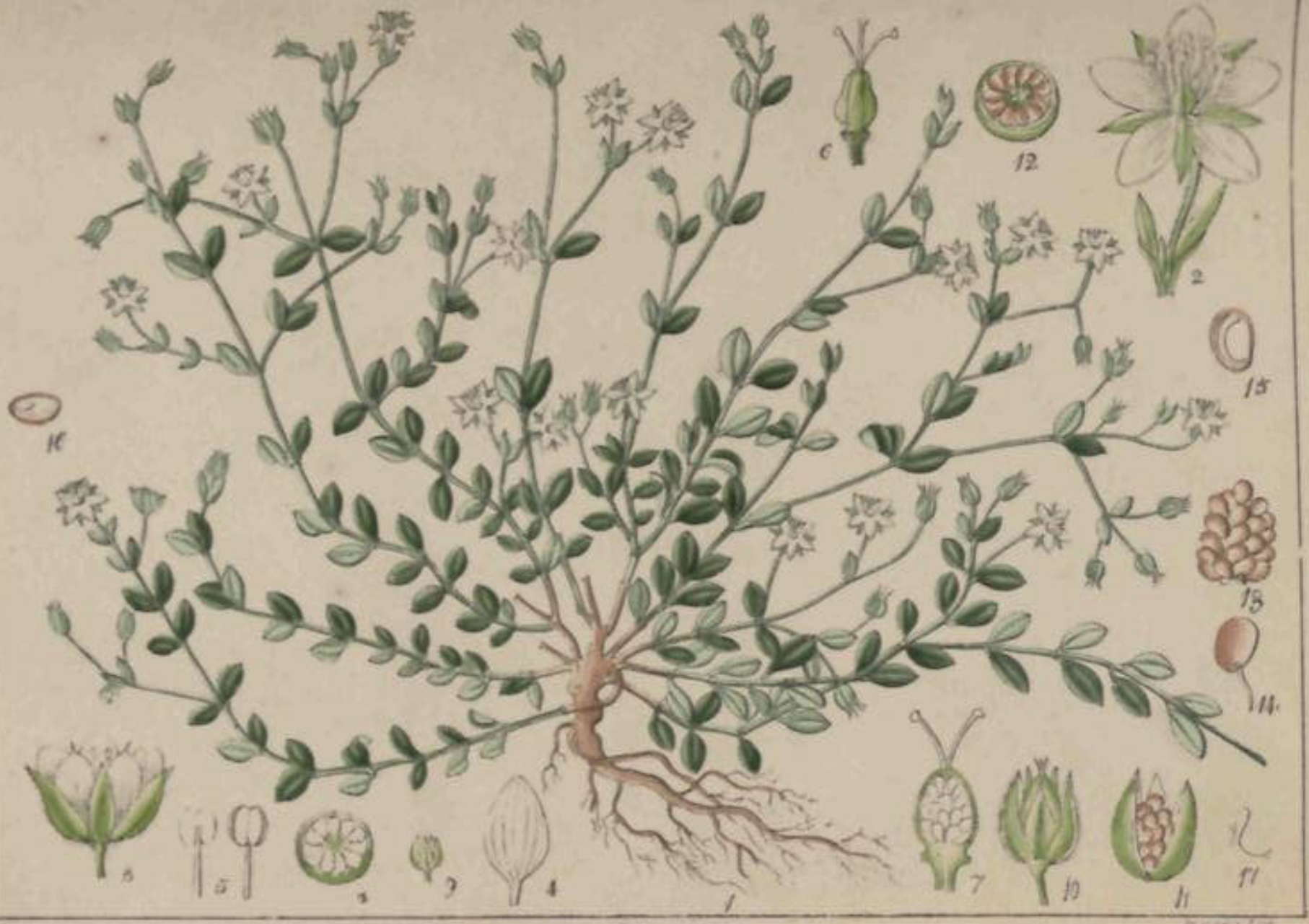
Hydnocarpus alpinus W. H.

Viola Riphiana, Wall.

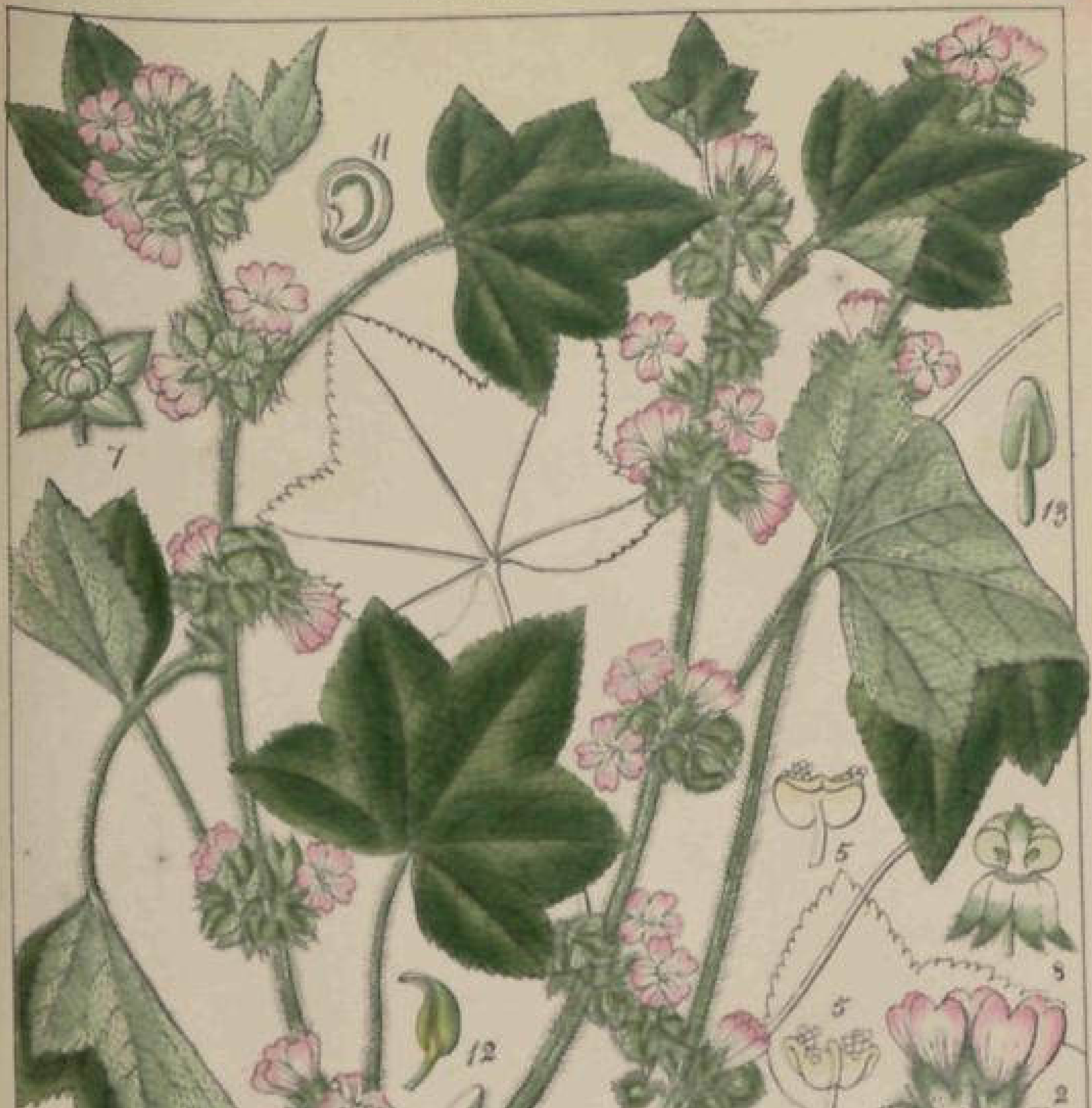
Drosera Burmanni (Vahl)

Parnassia Wightiana Wall.

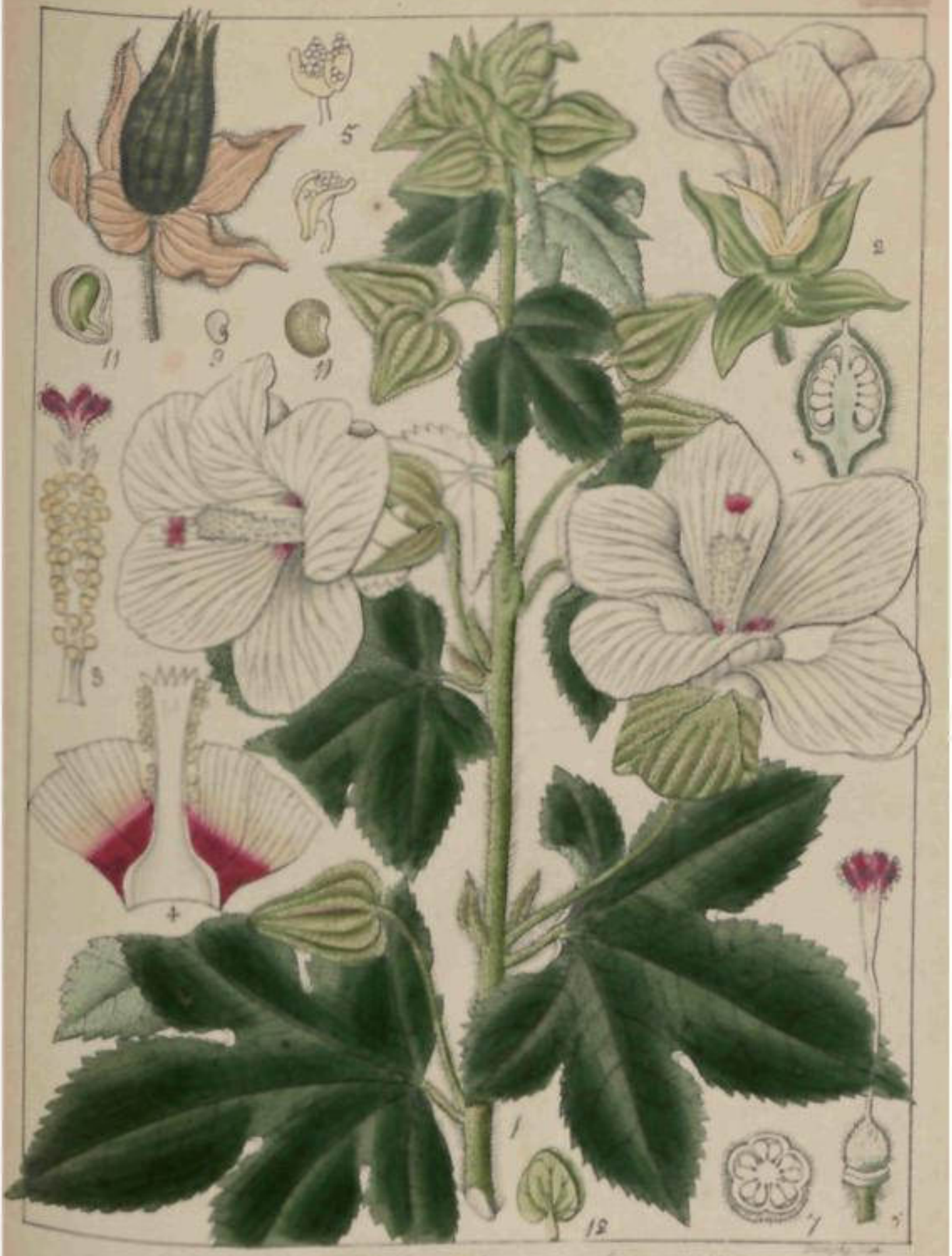
Polygala arillata (Hamm)



Arenaria neilgherrensis, W. & A.



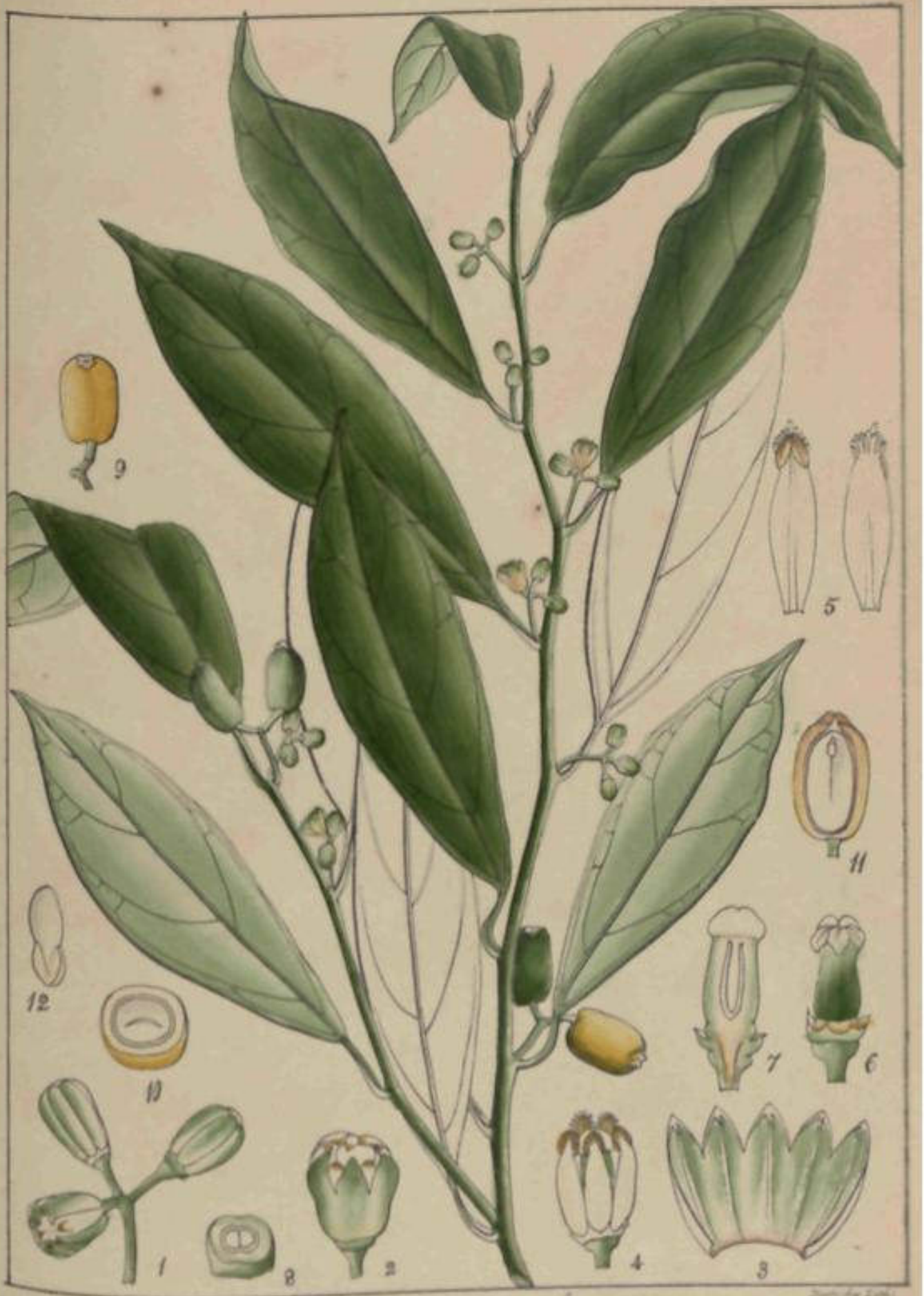
Malva neilgherrensis (R.W.)



Hibiscus sabdariffa angulosus Wall.

Monocera Munroii (R.W.)

Cleyera gymnanthera



Gomphandra polymorpha Z. (R. W.)

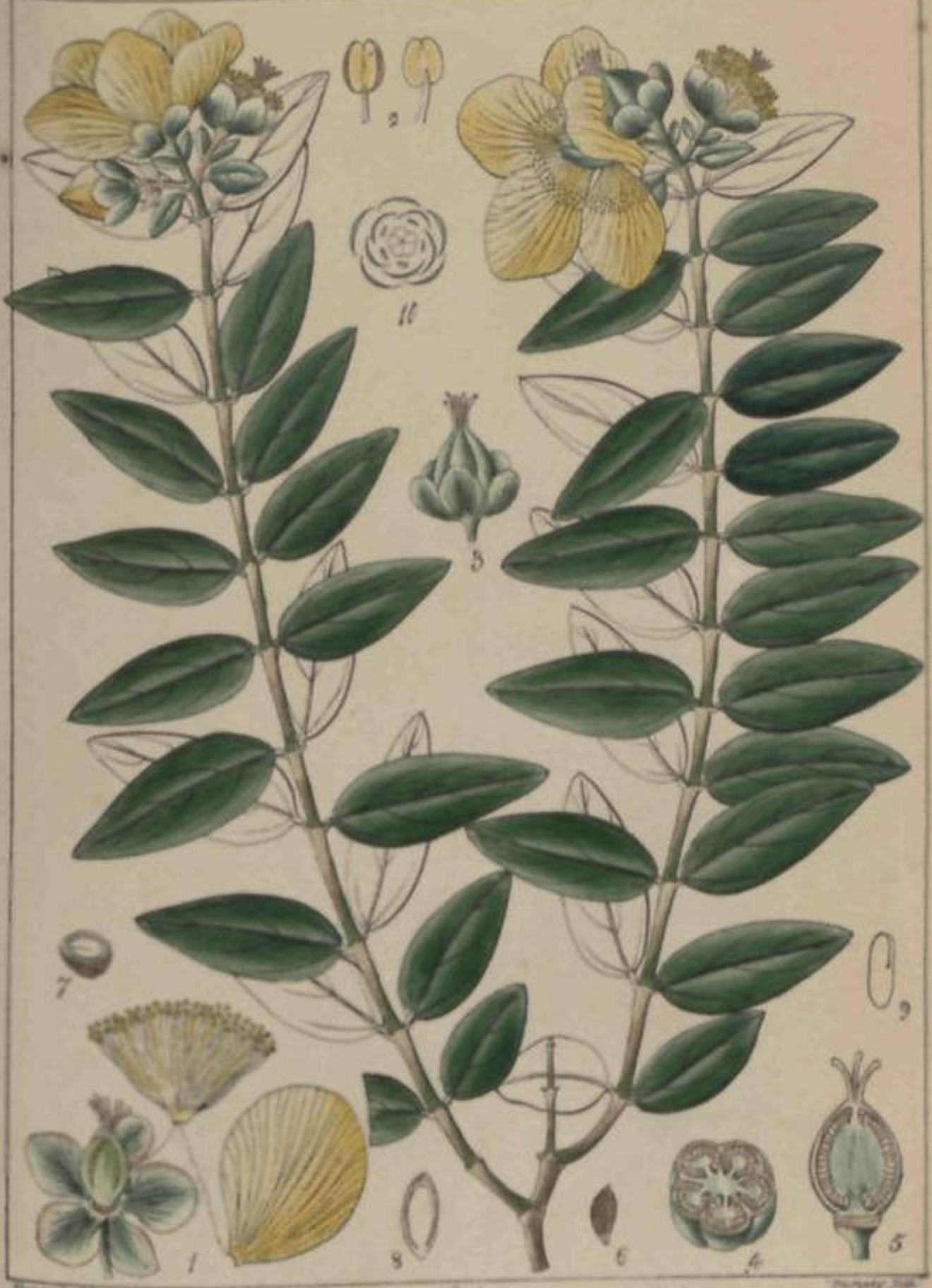
Gomphandra polymorpha S. (R.W.)

Stemonurus? fœtidus (R. W.)

Bursinopetalum arbicum W.

Citrus (a) Limonum (Risso)

Citrus (A.) vulgaris (Risso)



Hypericum Hookerianum (W.&A.)
Nees (Spach)

Garcinia papilla B (R. W.)

Garcinia papilla Z (R. W.)

Salacia macrosperma


3
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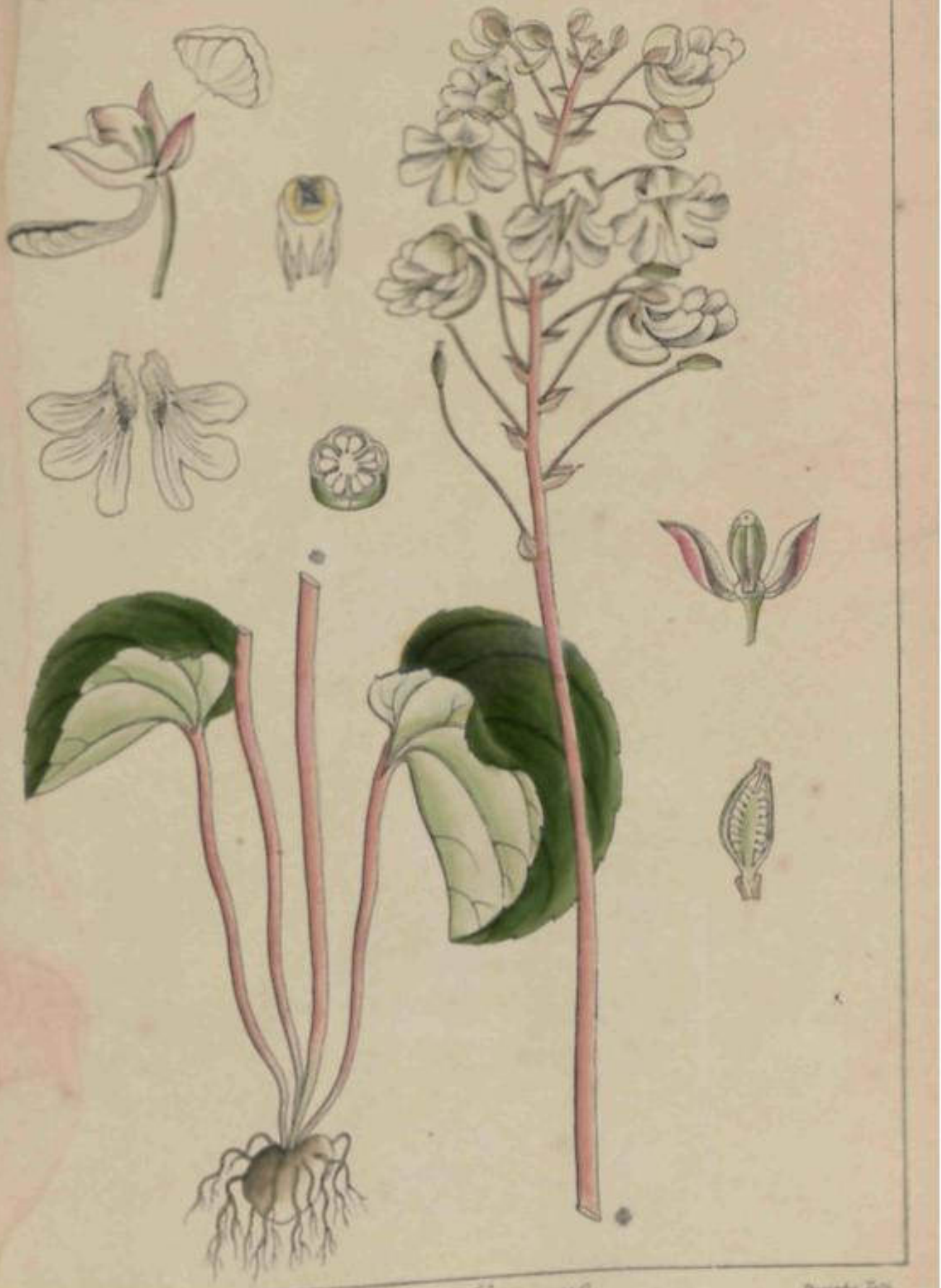
Mesua speciosa (Thwa.)


Melicytus ramiflorus
Melicytus ramiflorus Forst.

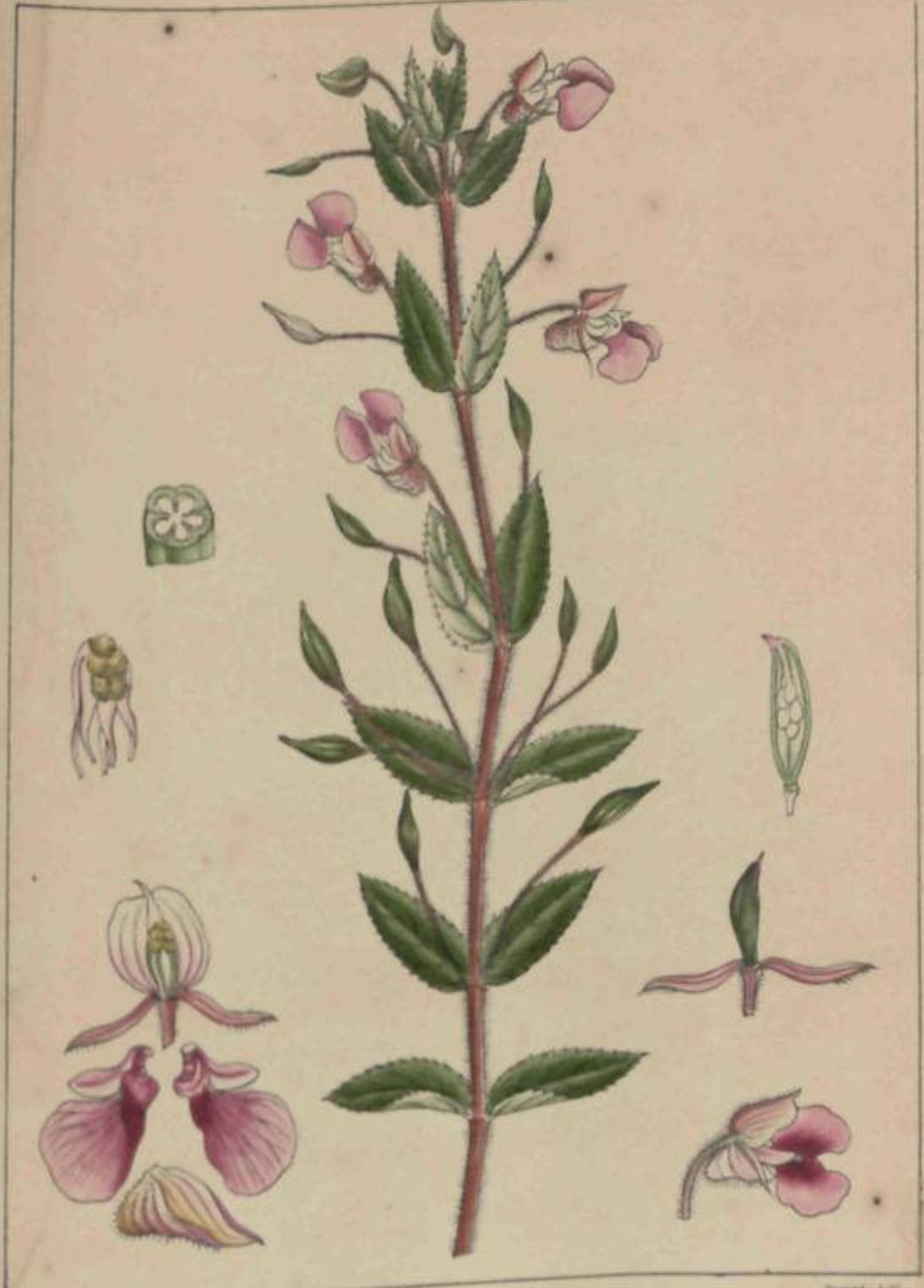
Vitis ampelopsis Neilgherrensis (R.W.)

Impatiens fruticosa (D.C.)



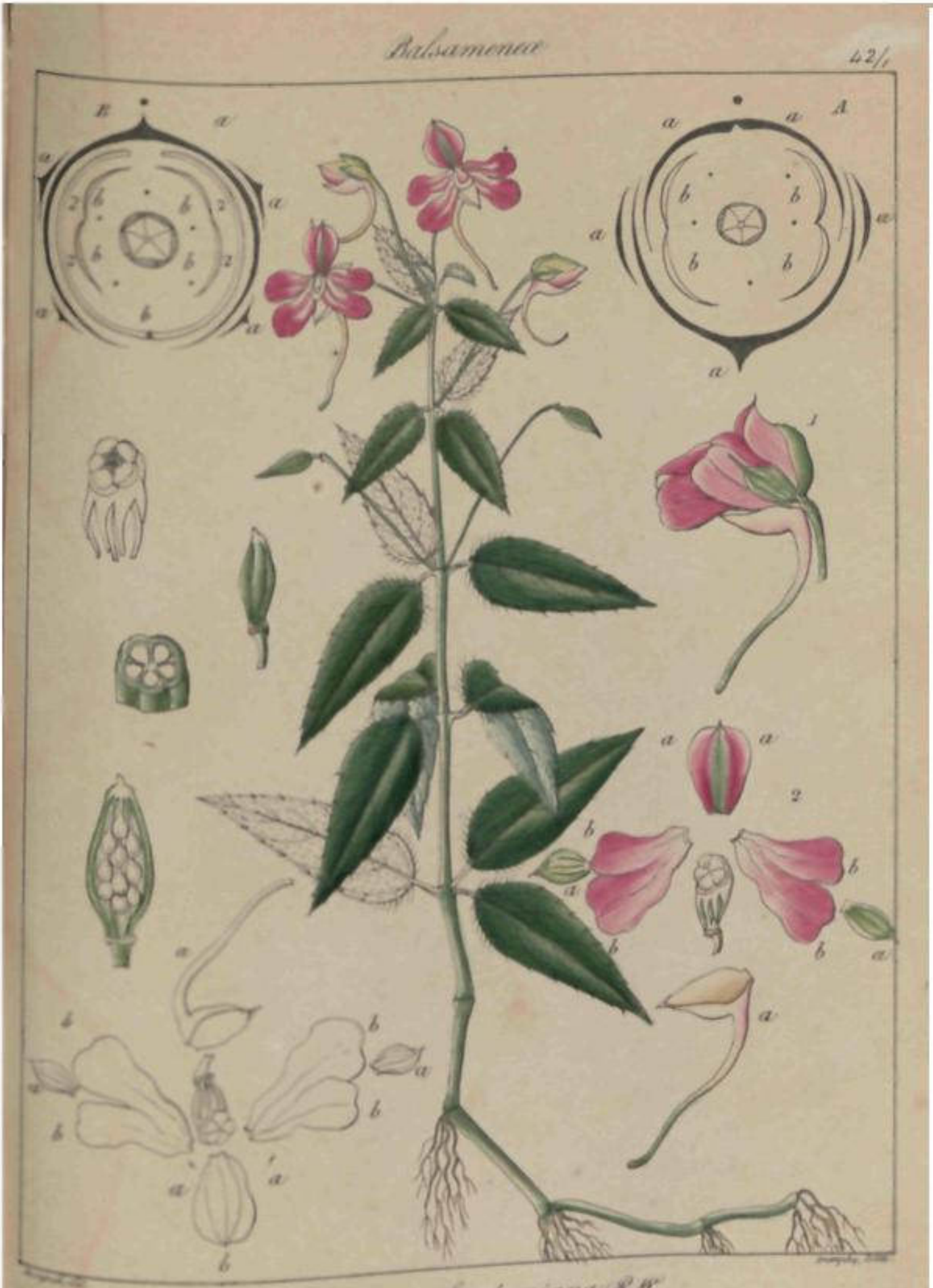
Impatiens scapiflora (Heyne)

Impatiens modesta (R. W.)



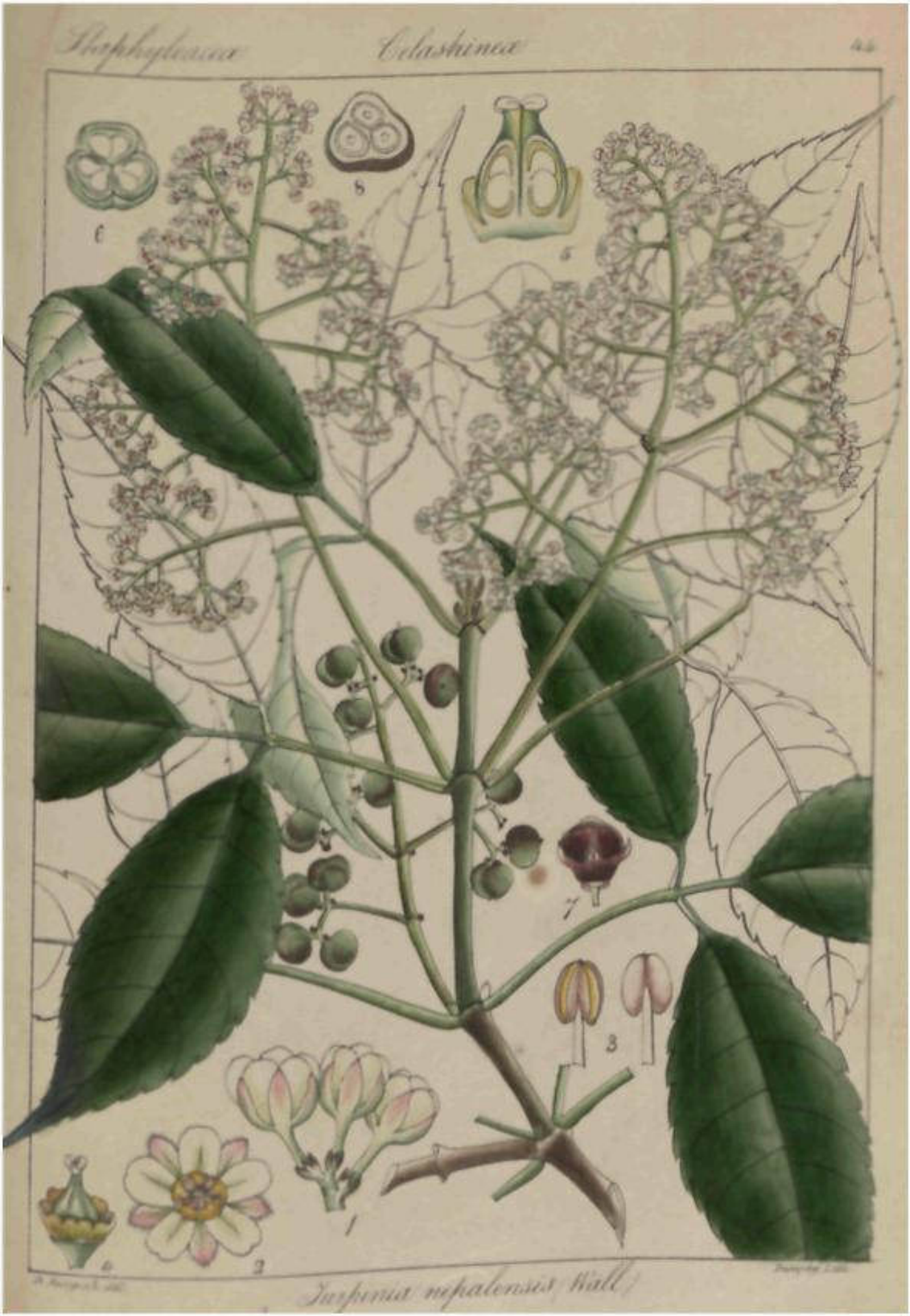
Impatiens rufescens (Benth.)

Impatiens inconspicua (Benth.)



Impatiens Spruneriana / R. W.

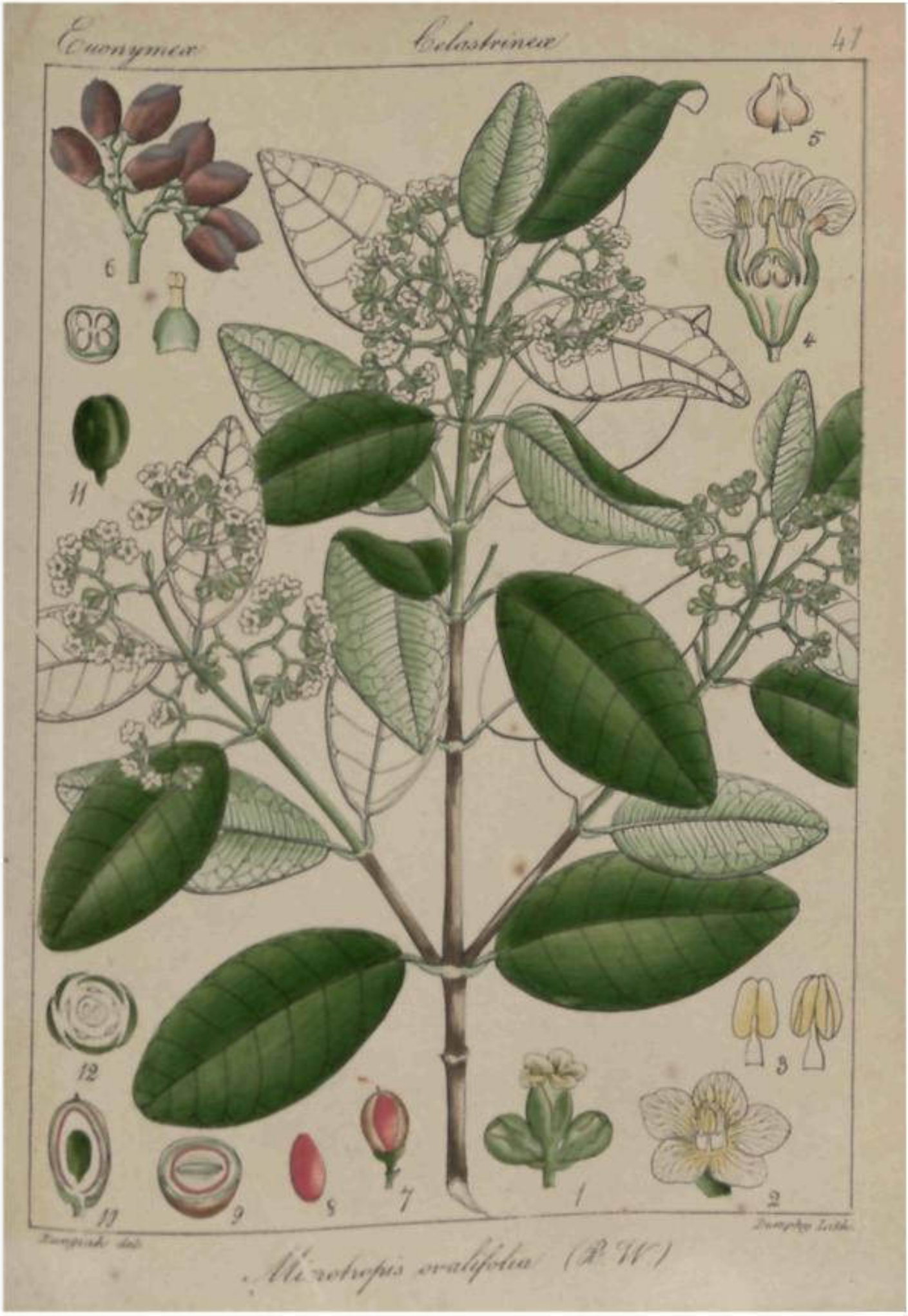
Pittosporum tobaspermum (W.&A.)



Turpinia nepalensis Wall.

Euonymus crenulatus, Wall. W. 4.

Microtropis microcarpa (R. W.)



Microtropis ovalifolia (P. W.)

Microtropis ramiflora (R. W.)

Rhamnus hirsuta (W. & A.)

Spinacia oleracea L.

Sophora glauca Lesch.

Crotalaria barbata (Garkem)

Crotalaria formosa (Graham)

Crotalaria Wallichiana (W. & A.)

Indigofera pulchella

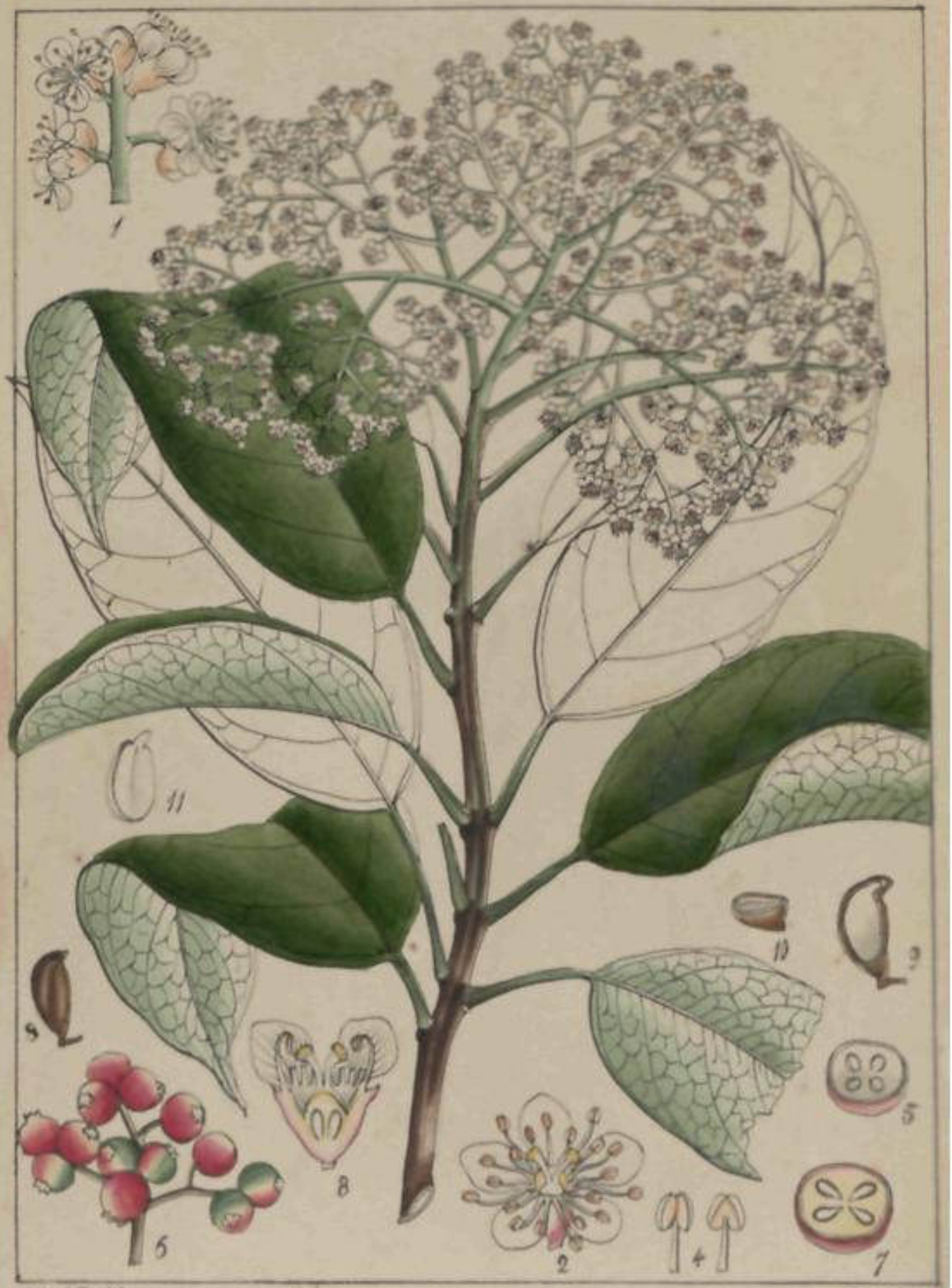
Indigofera pedicellata

Desmodium rufescens (D.C.)

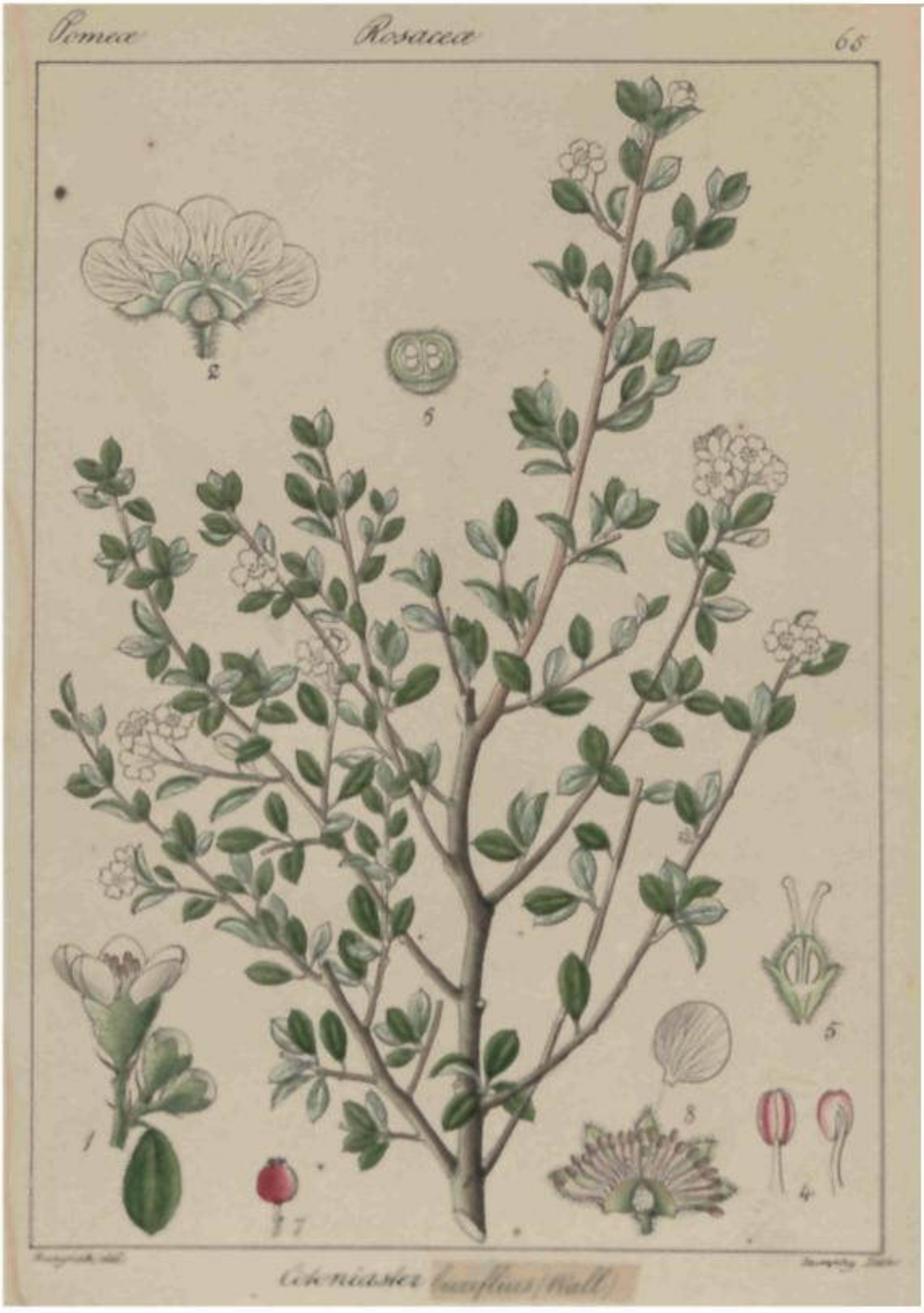
Desmodium strangulatum (W. & A.)

Smithia Glandra

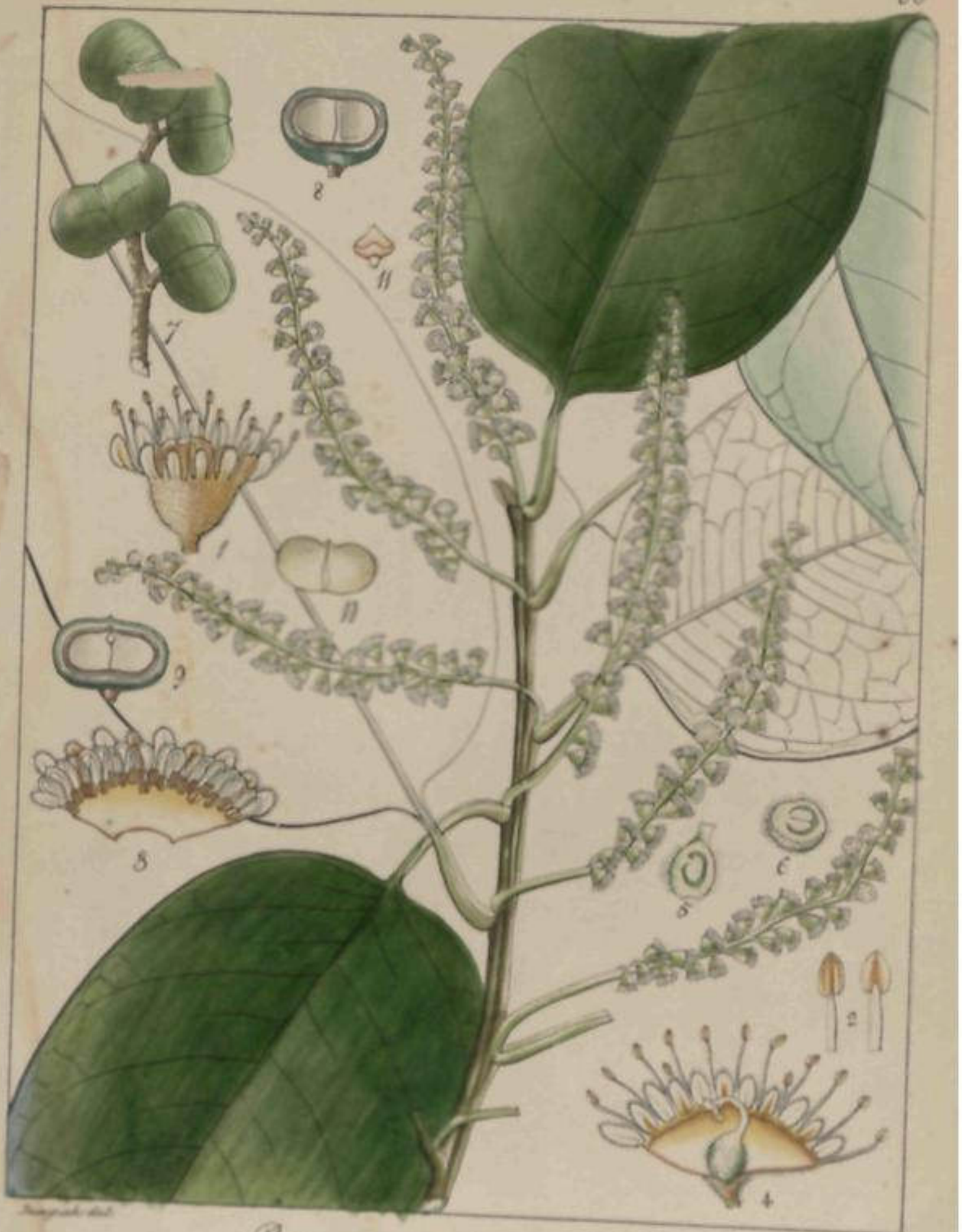
Hemingia procumbens (W.W.)



Photinia Niponiana



Cotoneaster [illegible] Wall.



Pygeum acuminatum ? (Celebr.)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Sonerila grandiflora (R. Br.)

Sonerila elegans R.

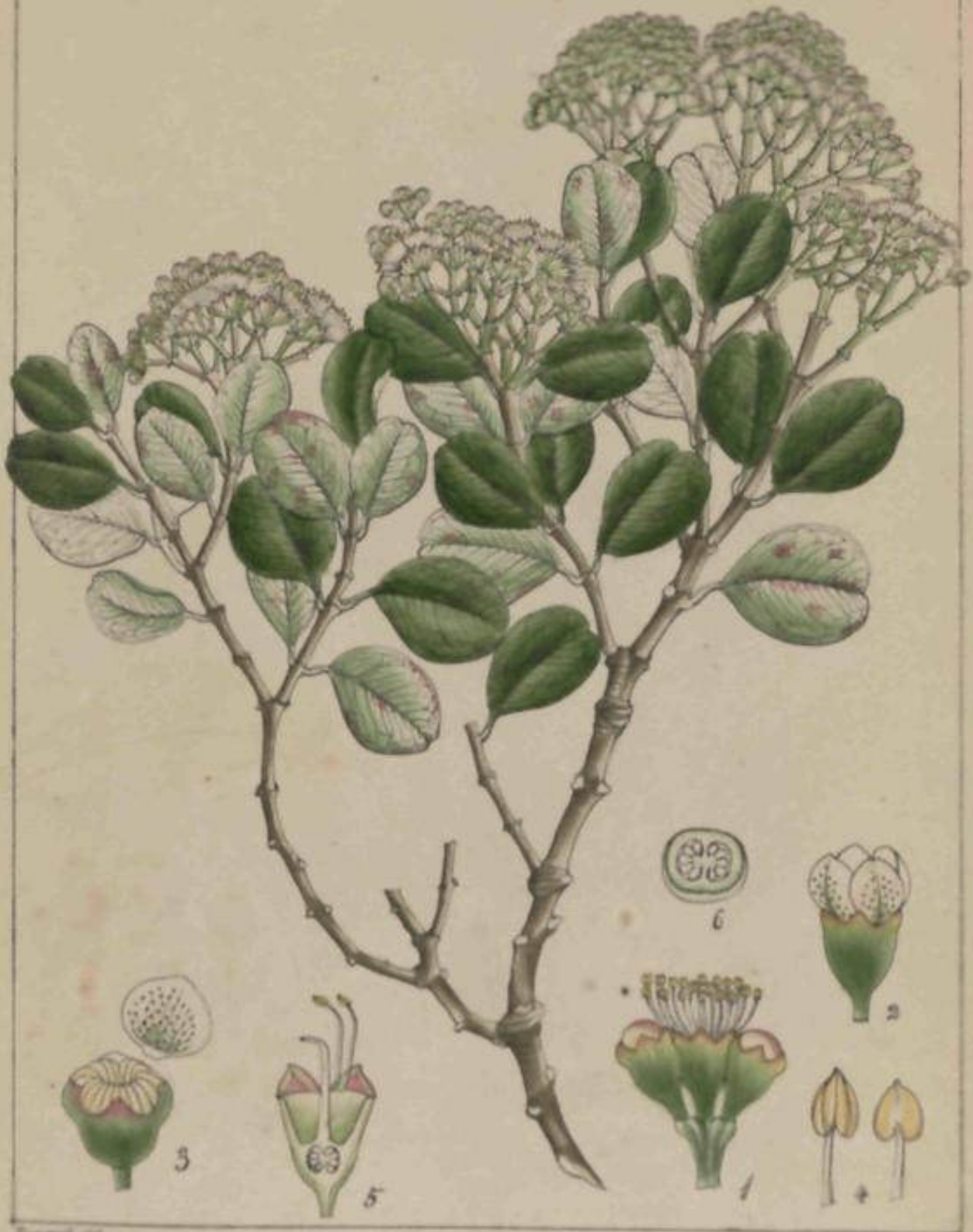
Osbeckia Taschenwaltiana

Osbeckia Wightiana (Benth.)

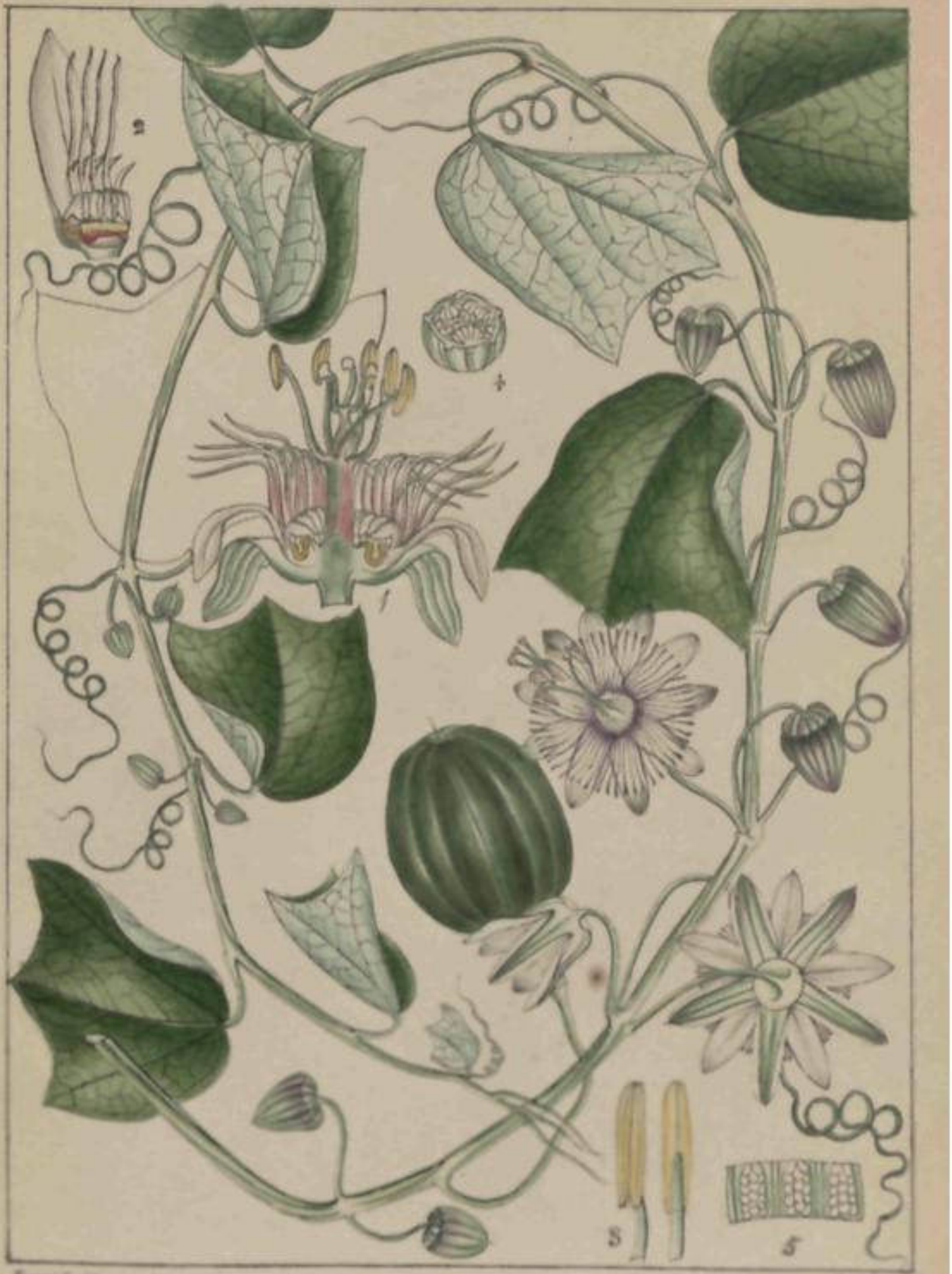
Osbeckia Gardneriana

Myrtus tomentosa

Eugenia (§) arnottiana (K. W.)

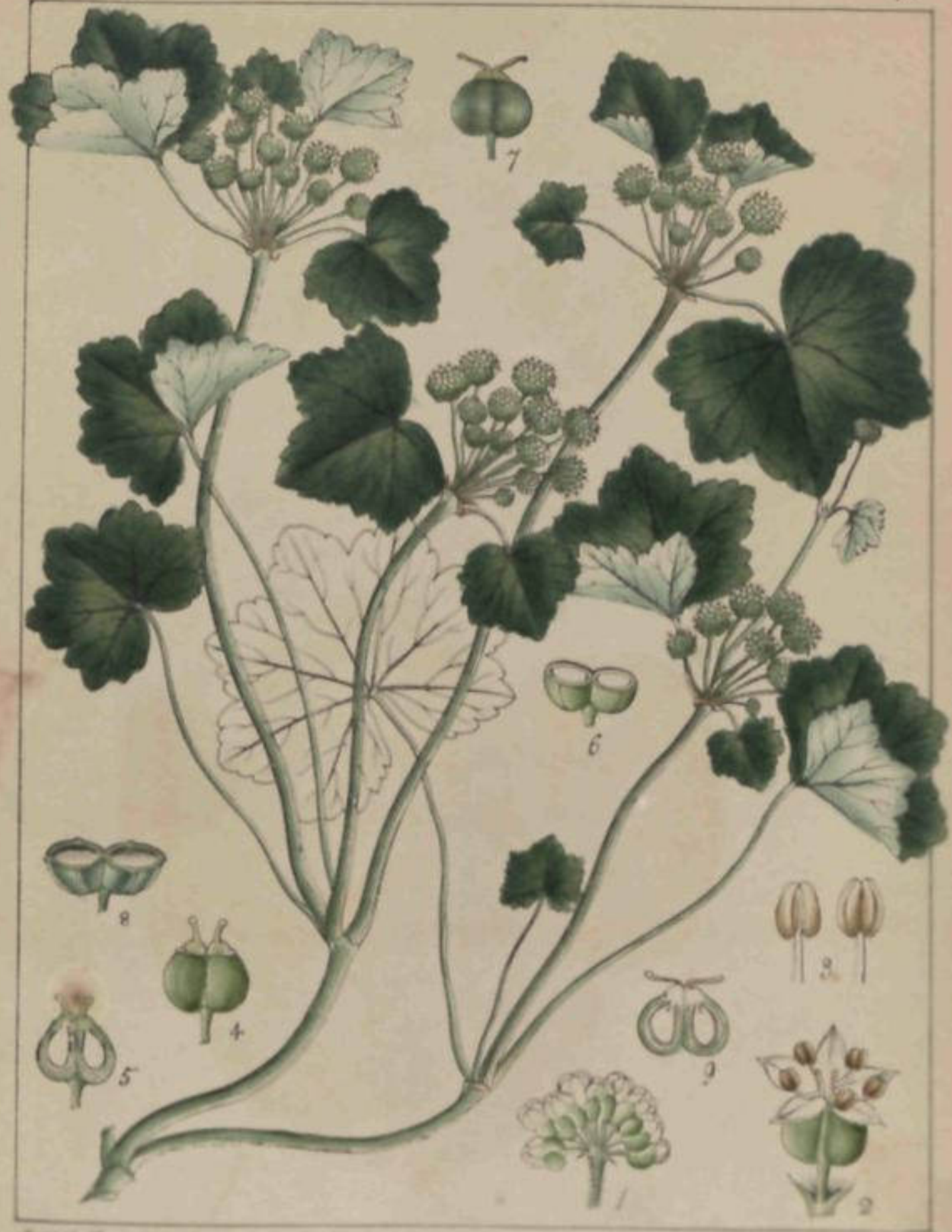


Eugenia Scalophyllifolia (R. W.)

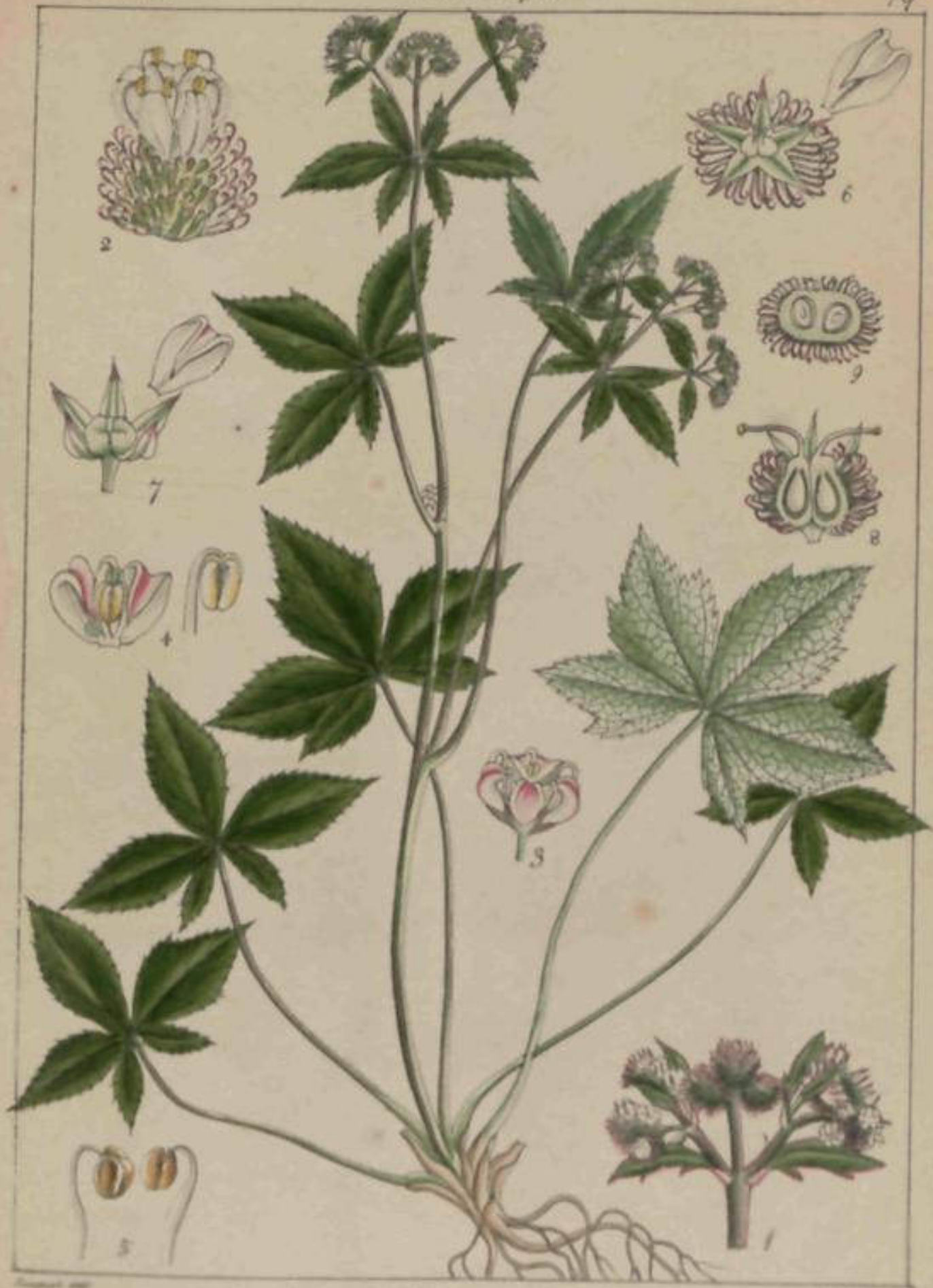


Passiflora Leschenaultii (DC)

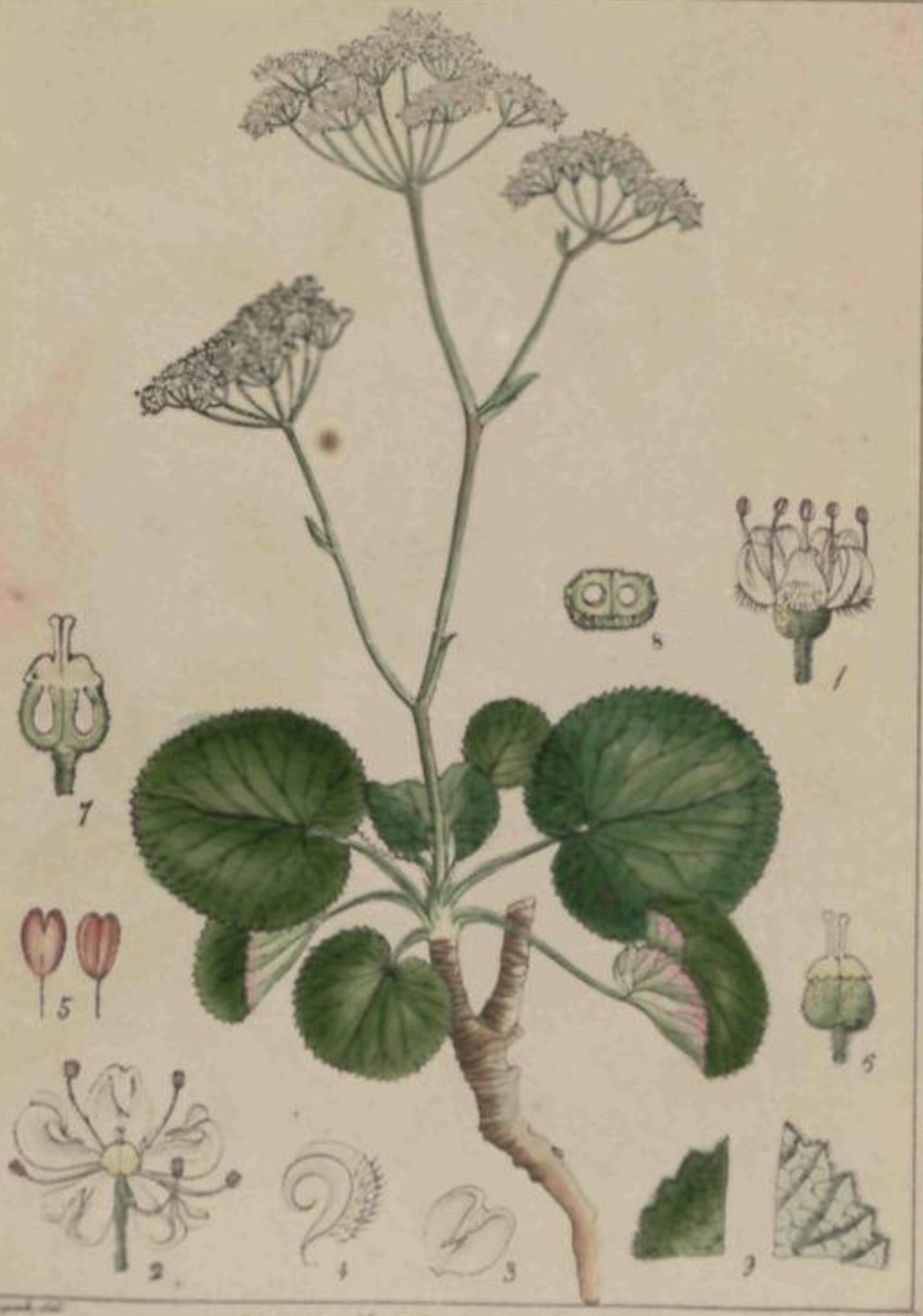
Kalanchoe grandiflora (Wall.)



Hydrocotyle peltigephala (N.E.B.)

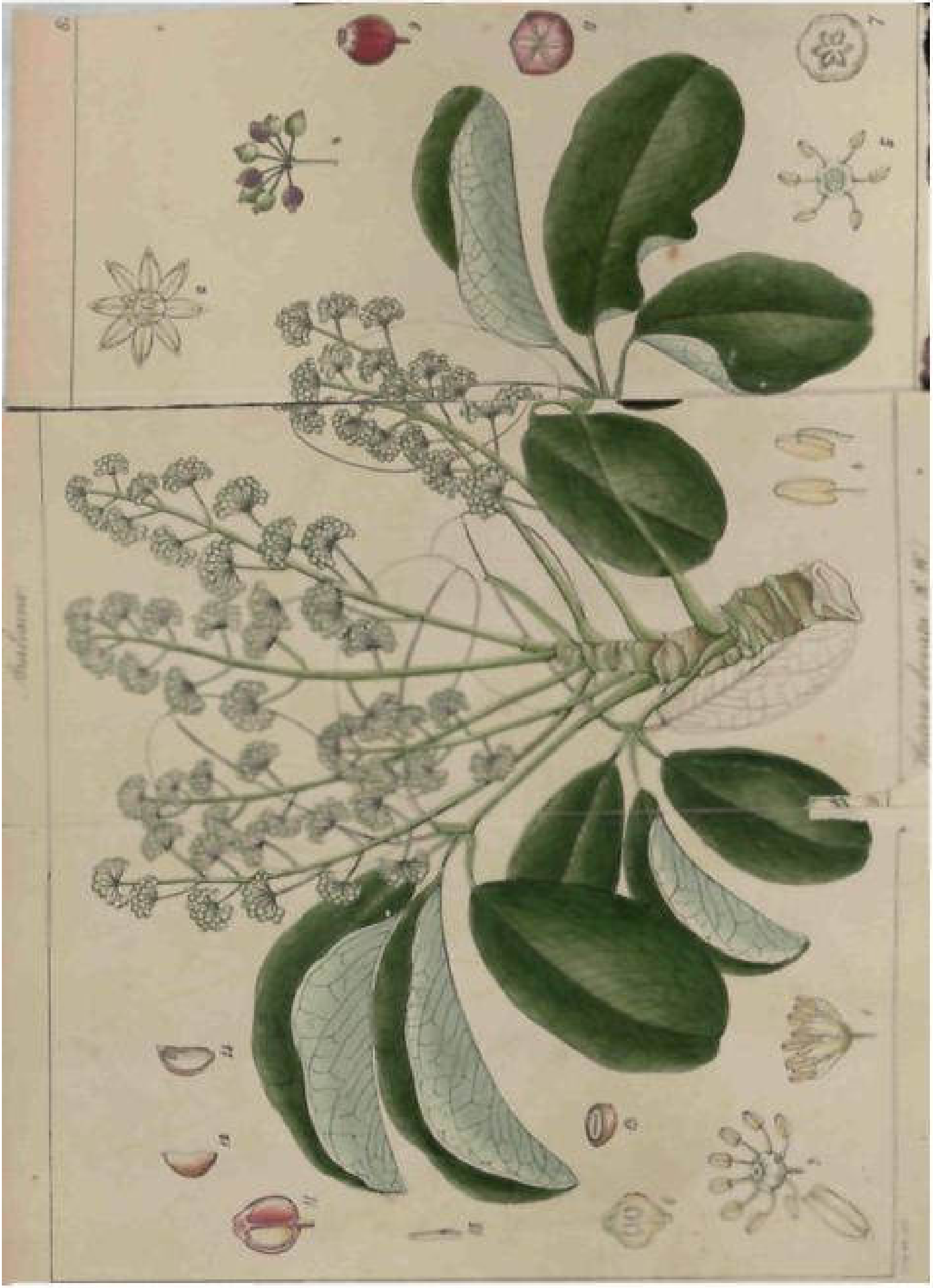


Sanicula elata (Wiam)



Pimpinella Leschenaultii (DC.)

Bupleurum ramosissimum (81.4)



Pastinaca rigens R.W.
Heracleum rigens Willd W.S.

Hedera nepalensis (K. W.)

Viscum orbiculatum

Loranthus Neilgherrensis.

Viscum moniliforme (B.C.)

Viburnum acuminatum (Wall.)

Viburnum Wightianum (Wall.)

Lonicera ? L. ligustrina ? Wall.

Hedyotis (D. Saussonia (Wt. 4)

Hedyotis D. stylosa (Brown)


Amaryllidaceae
Amaryllideae
90
1
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Hæmanthus coccineus (Willd.)

Wendlandia Notoniana (Wall.)

Lasianthus cymulosa (R.W.)
Ixora cymulosa (W.&A.)

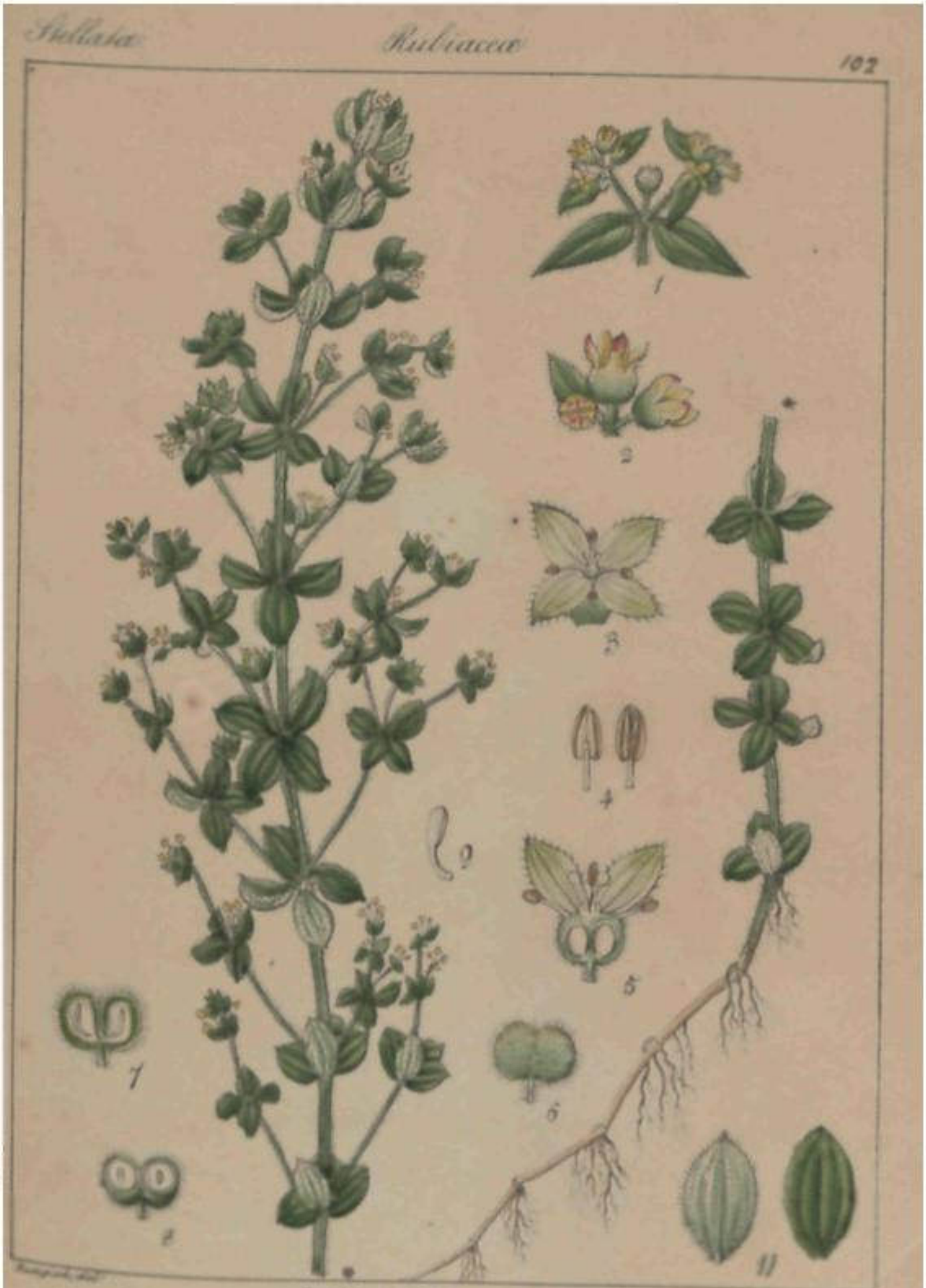
Canthium umbellatum (W.)

Guamilea longeska (W.&A.)

Psychotria bisulcata (W.&A.)

Coffea alpestris (K. W.)

Coffea grumelioides (R.W.)



Galium Reguerianum (W. K.)

Vernonia pectiniformis (D.C.)

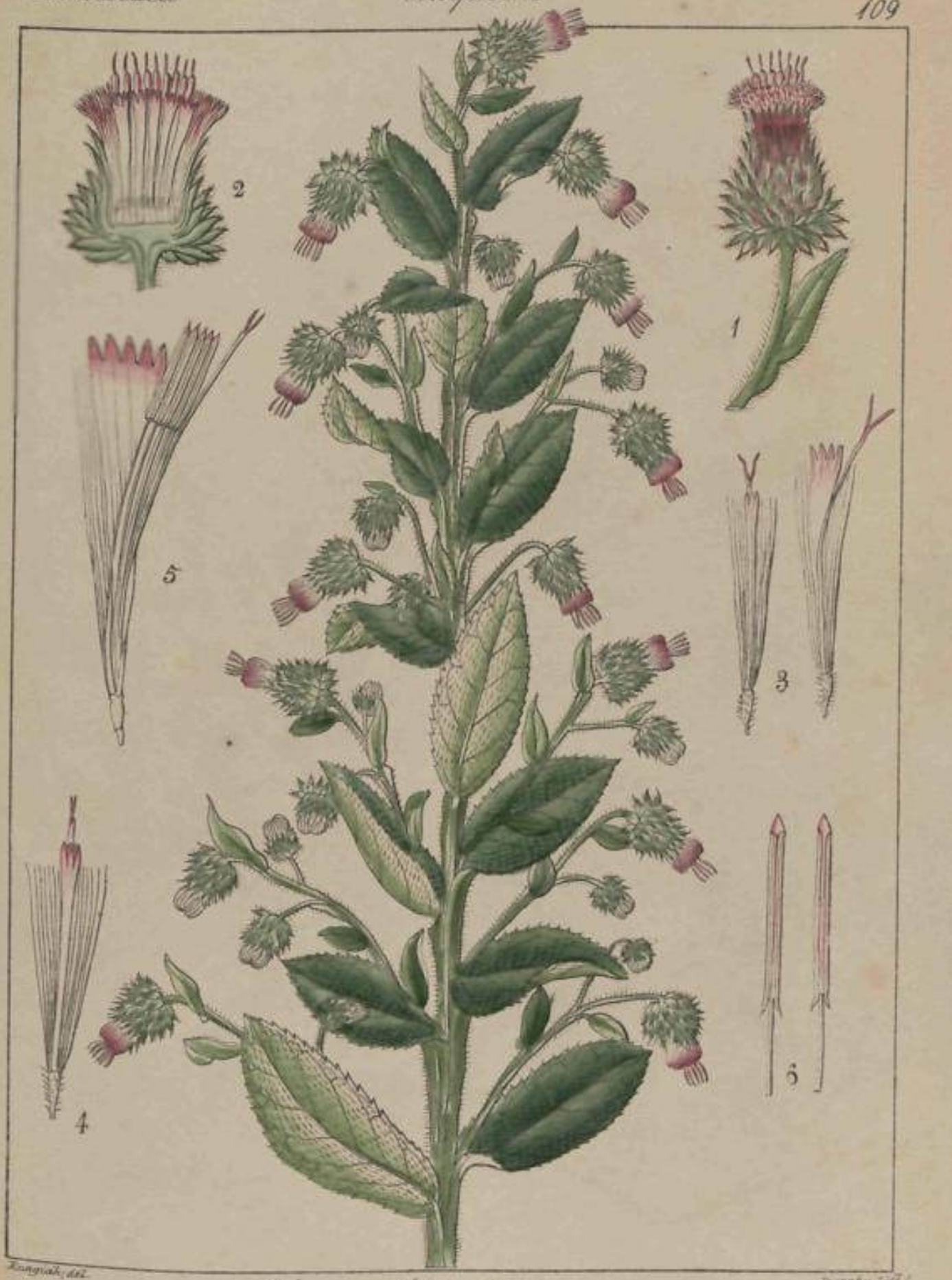
Dicoma tomentosa (D.C.)

Monosis Wightiana

Erigeron Wightii (D.C.)

Myriactis Wightii (D.C.)

Dichrocephala chrysanthemifolia (D.C.)



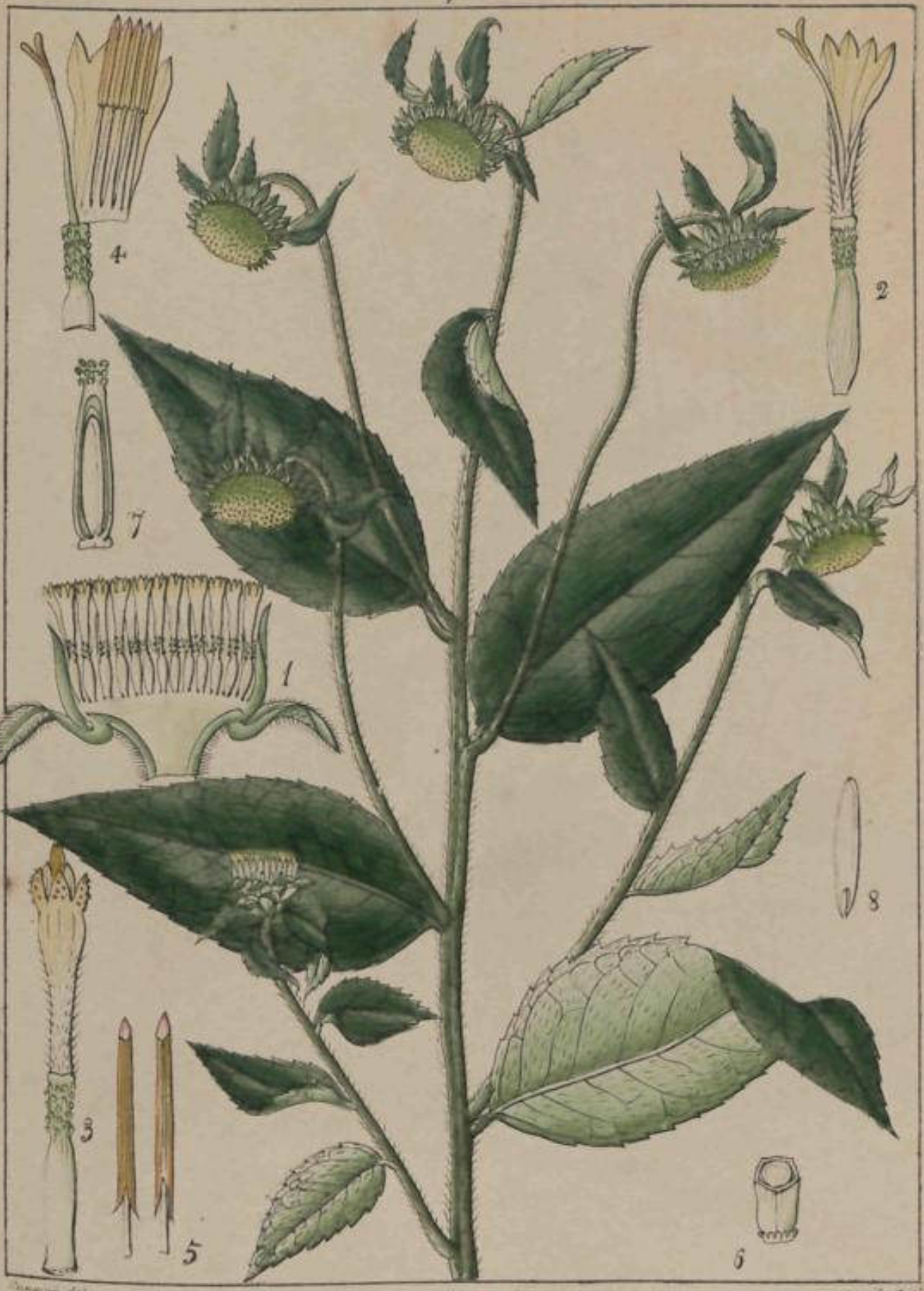
Blumea alata (D.C.)
B. cornua

Rungiah del. Dumphry Lith.

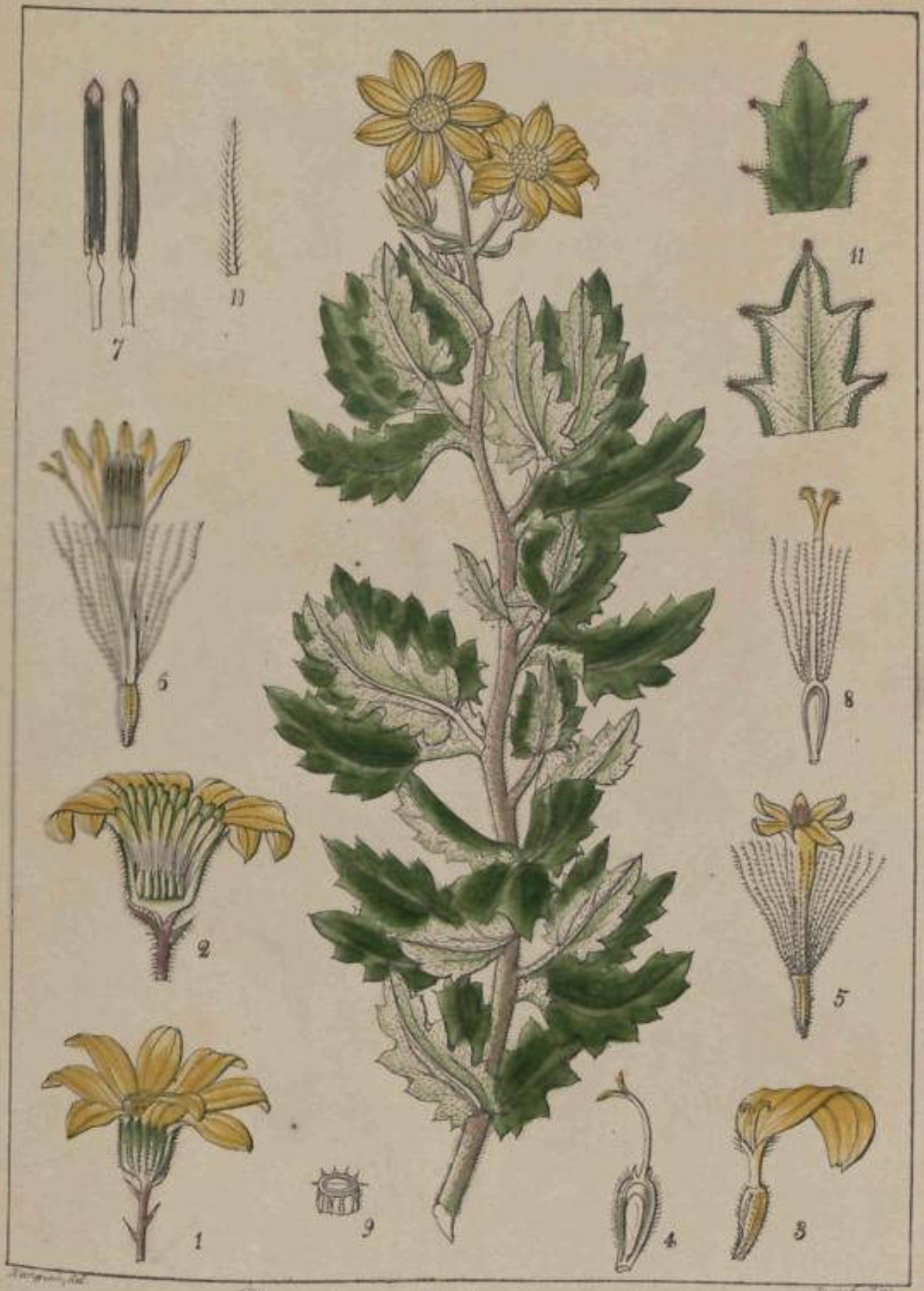
Helichrysum buddleioides (D. C.)

Rungius del. Dumpky Lith.

Moonia Arnottiana. (Rt. W.)

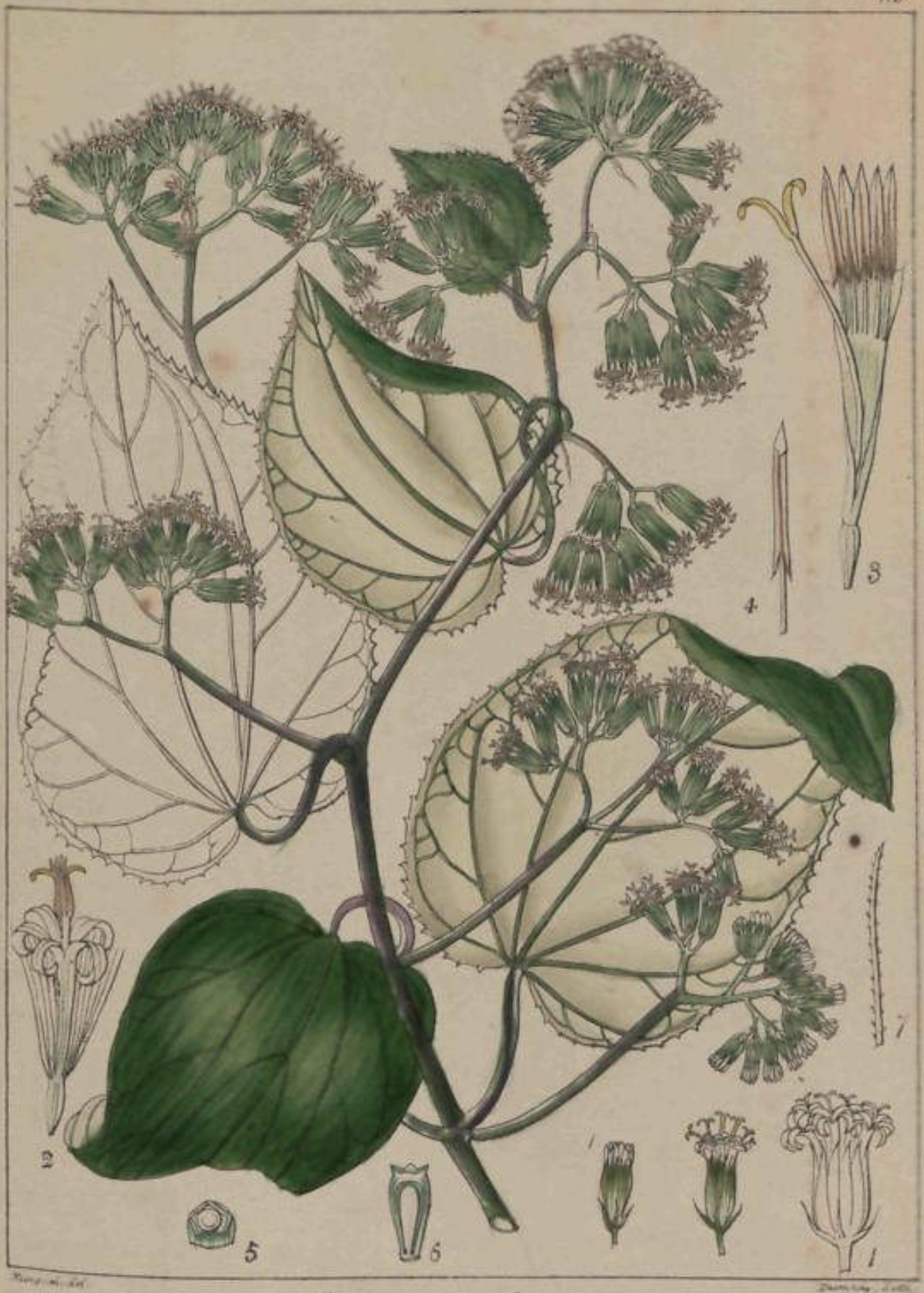


Carpesium Nepalense (Less)



Doronicum Sessingianum (Arn)

Doronicum candolianum (Ain)

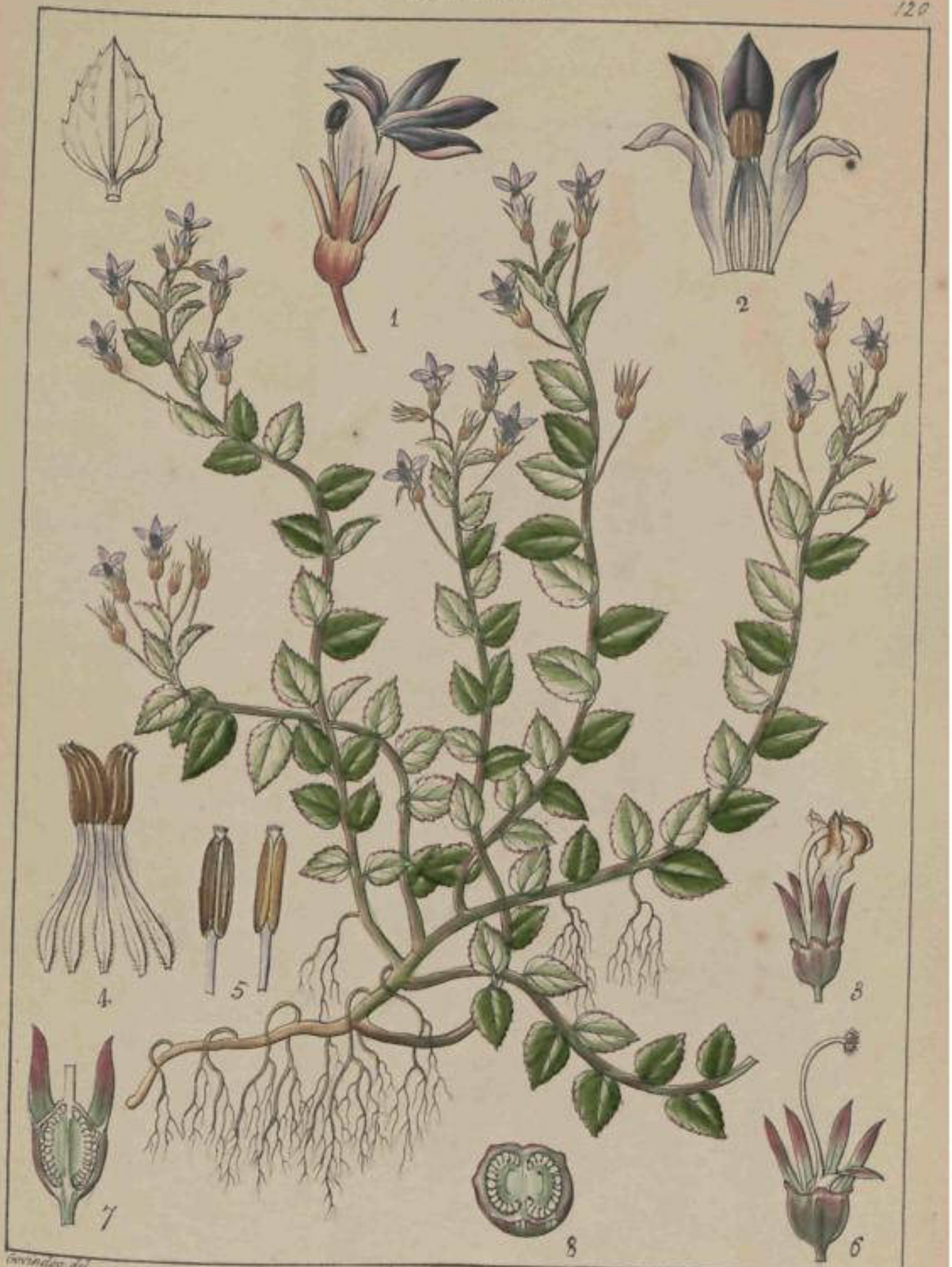


Senecio corymbosus

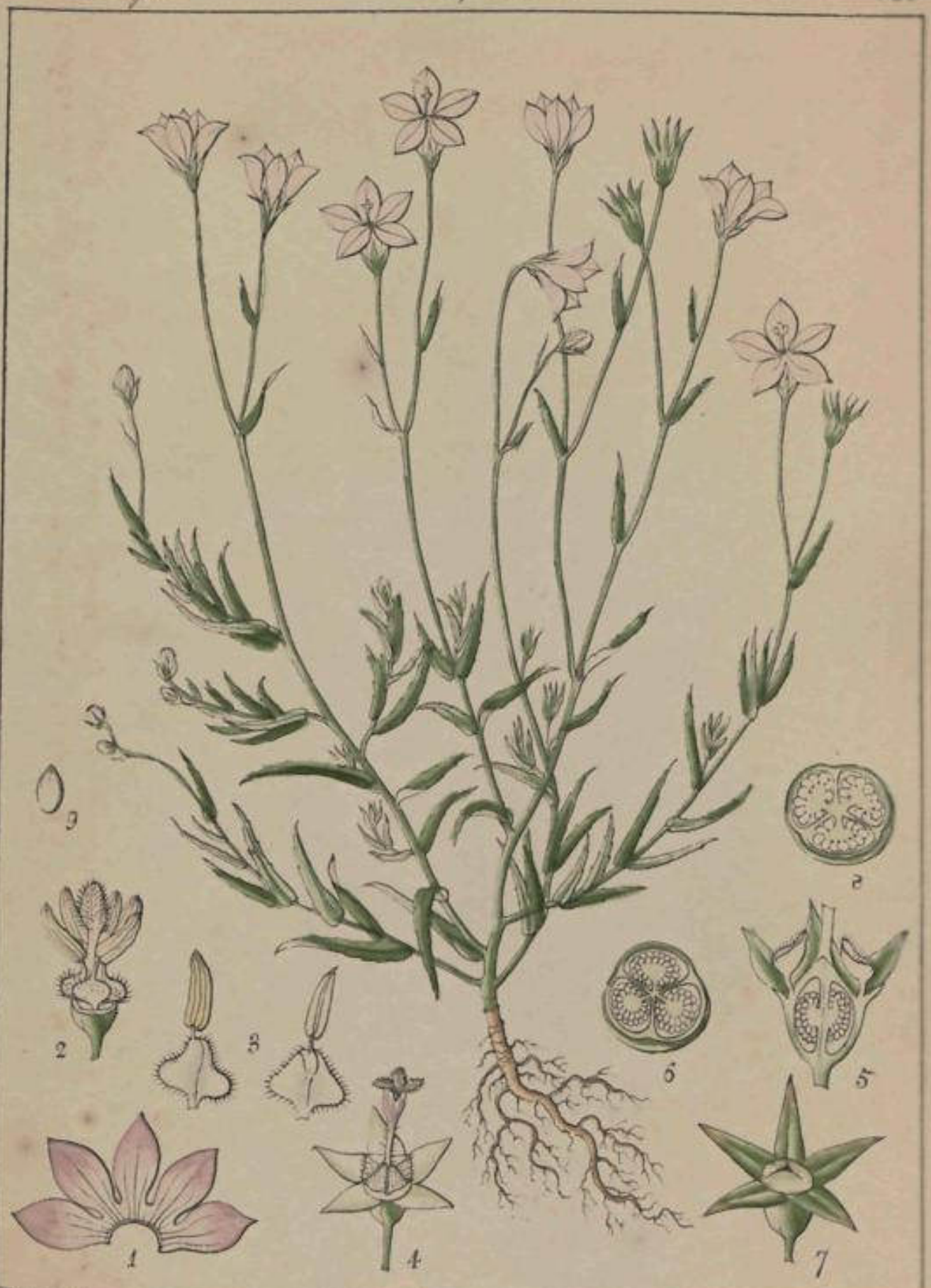

Cirsium argyrianthum (DC)

Macrorhynchus (Lactuca) glabra (L.)
Lactuca glabra (L.)

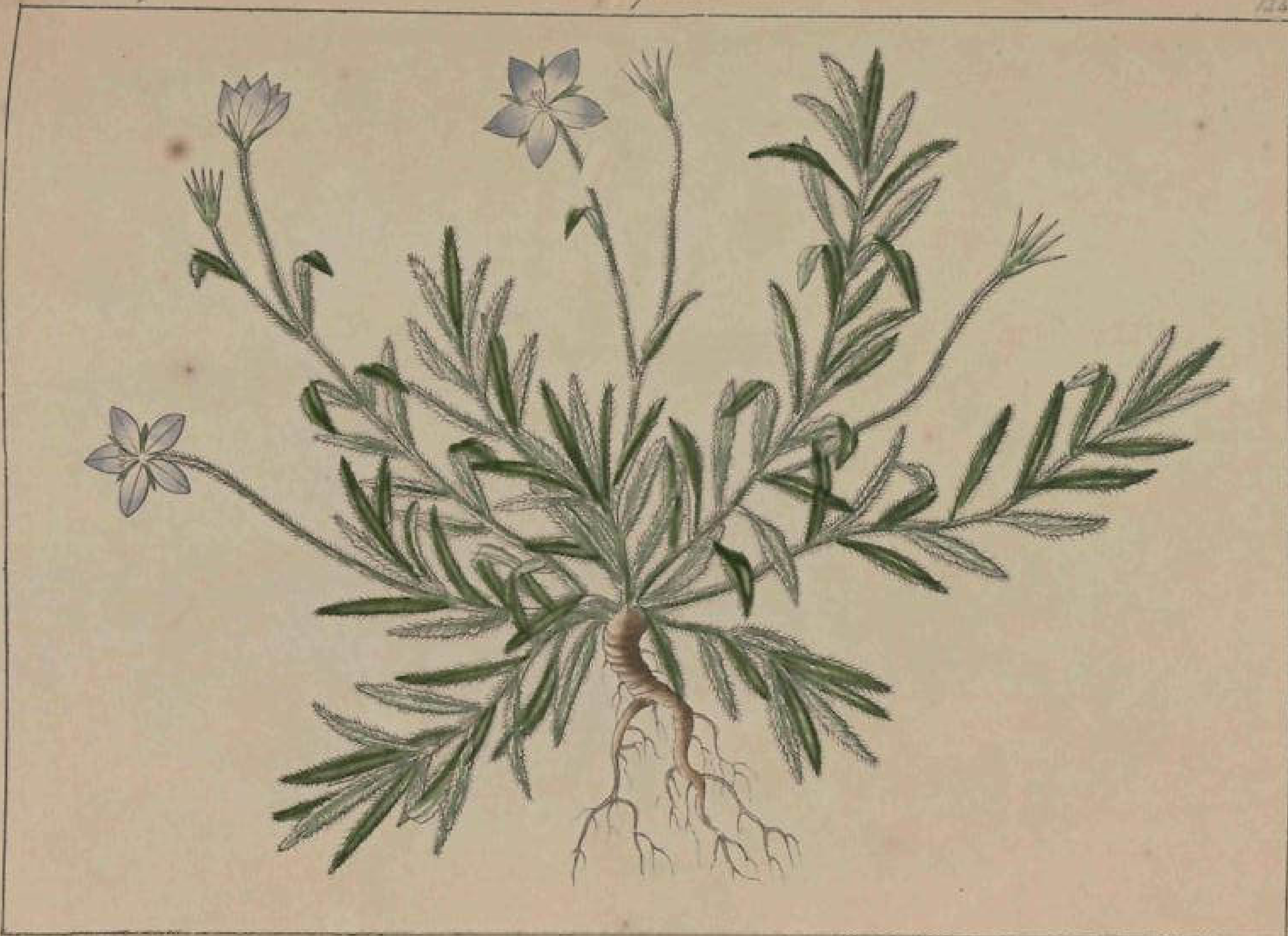
Mulgedium Wulgherynse (R.W.)



Lobelia trigona (Roxb.)

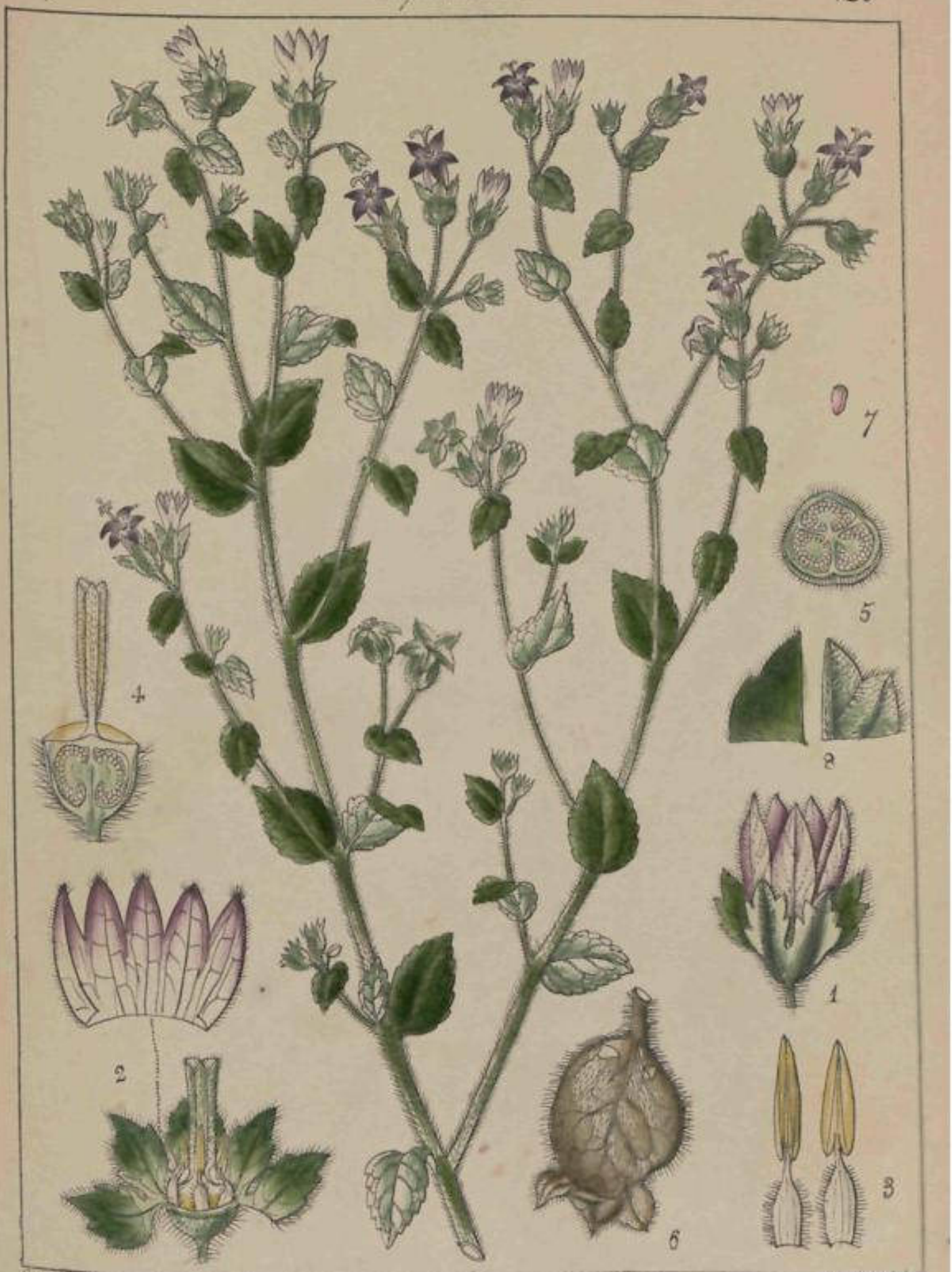


Wahlenbergia agrestis (A.C.D.C.)

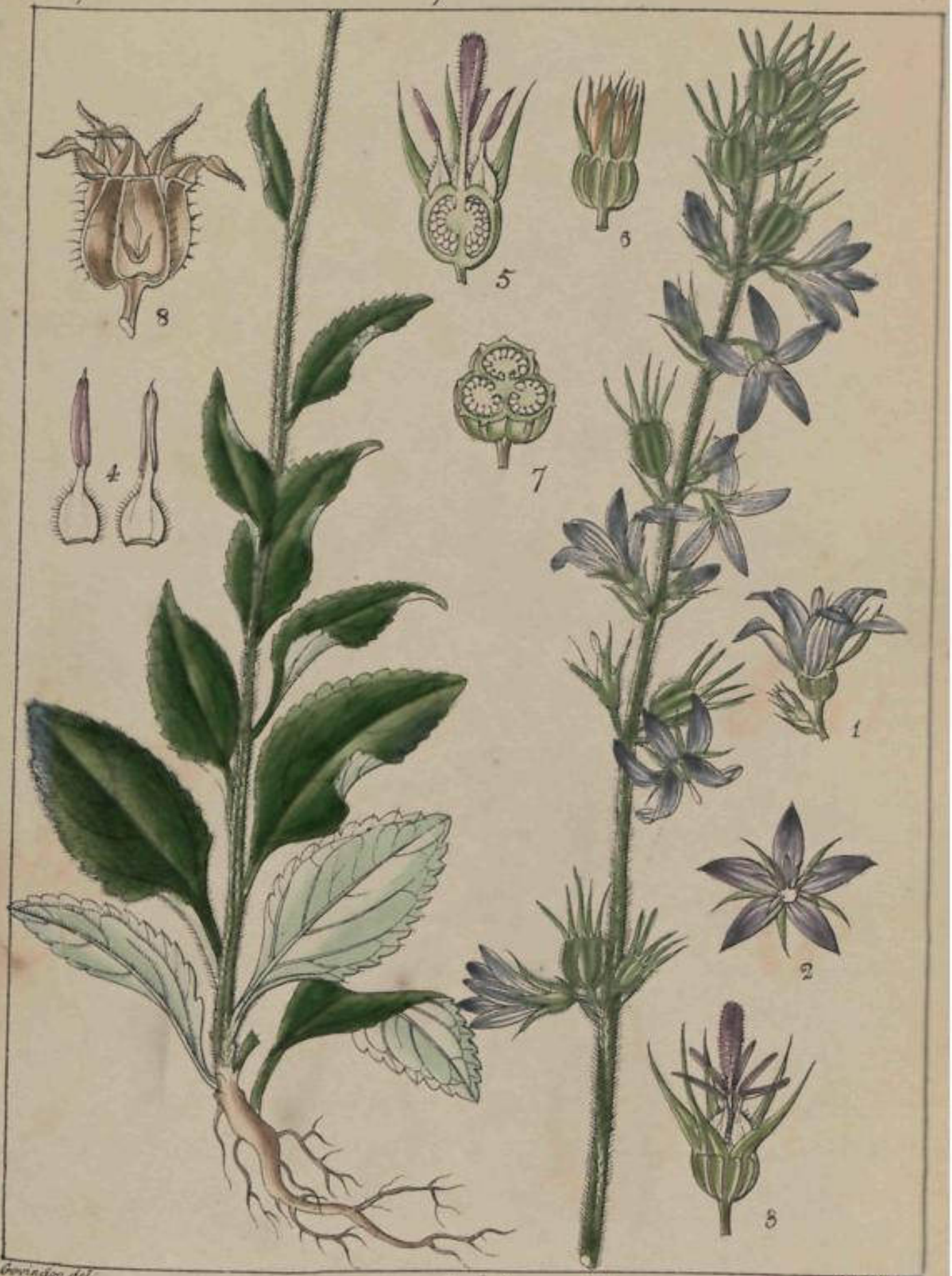


Wahlenbergia Indica (Alph. D.C.)

Campanula alphonsii (Wall.)



Campanula ramulosa (Wall.)

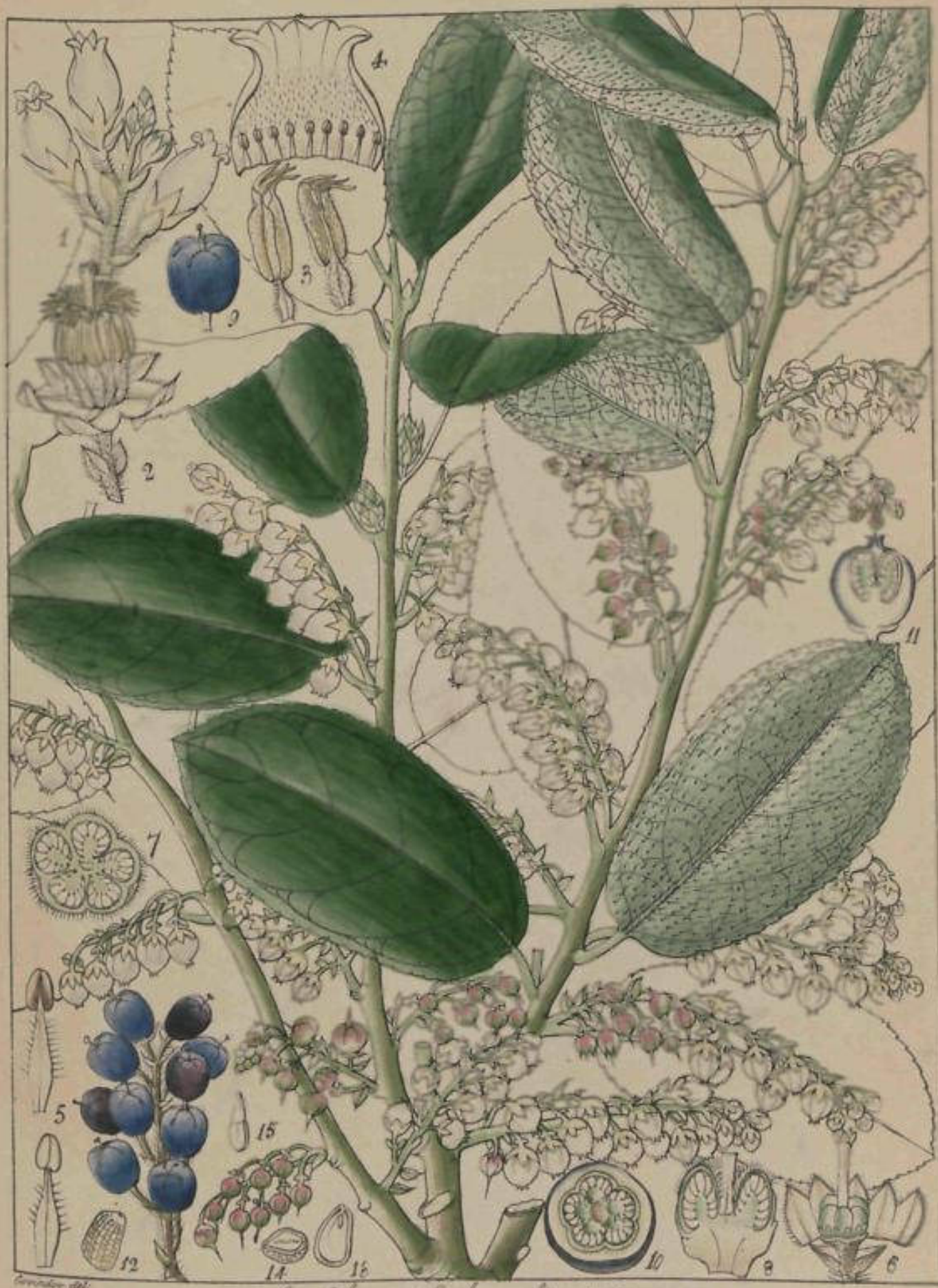


Govindoo del. Dunphy, Lith.

Campanula fulgens (Wall)

Vaccinium (agapetes) Teschenaultii (R.W.)
V. arboreum (Lasch. mscr. Mucka)

Vaccinium (Agapetes Nilgherrense) R. W.

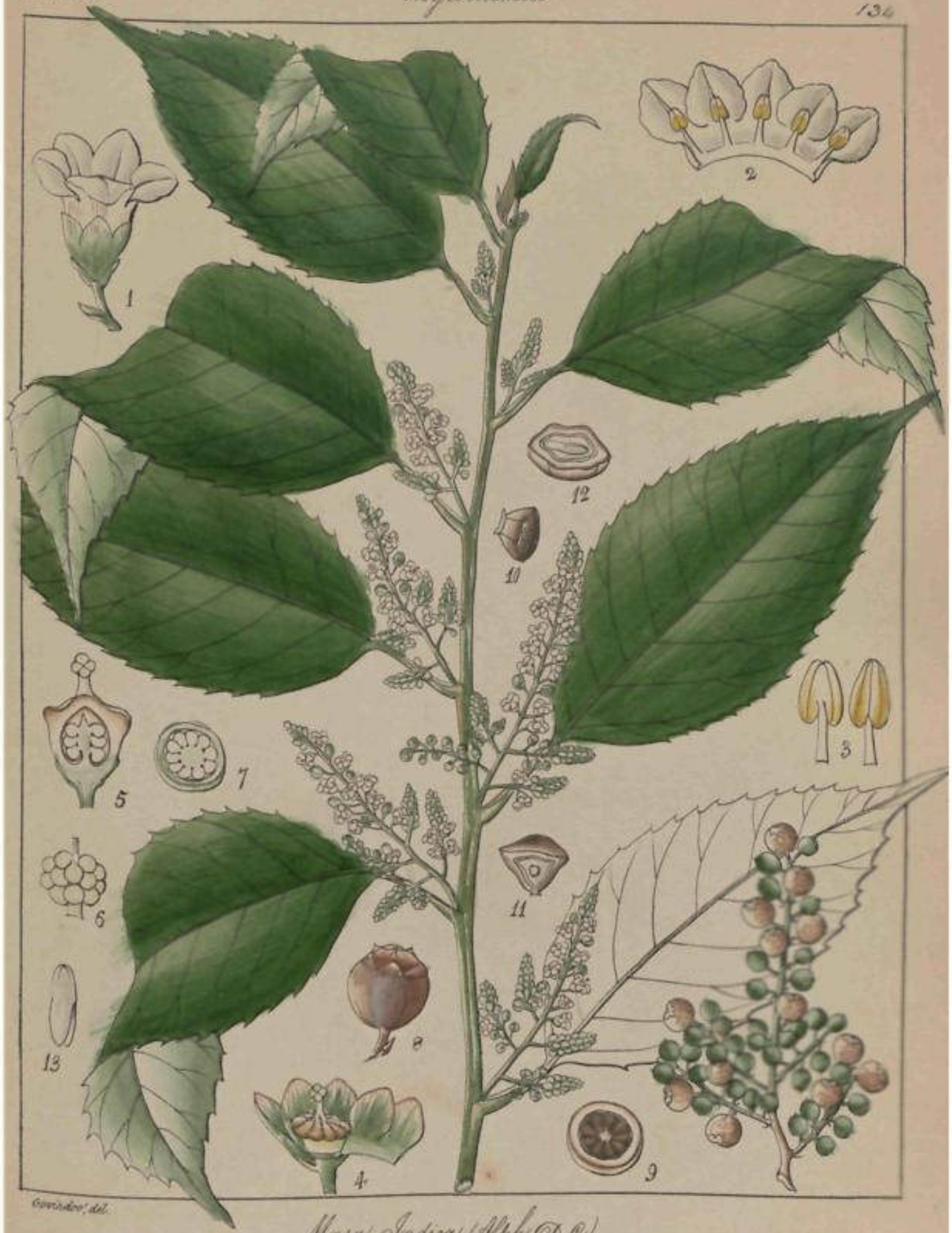


Gaultheria Leschenaultii (D.C.)

Rhododendron arboreum (Smith)
var B roseum (Lindley)

Lysimachia (E.) Leschenaultii (Duby)

Anagallis latifolia (Linn.)



Gonindo' del.

Musa Indica (Alph D.C)

Embelia Gardneriana (R. W.)

Chorisepalum aurantiacum (Alph. D.C.)

Govindoo del.

Myrsine capitellata (Wall)

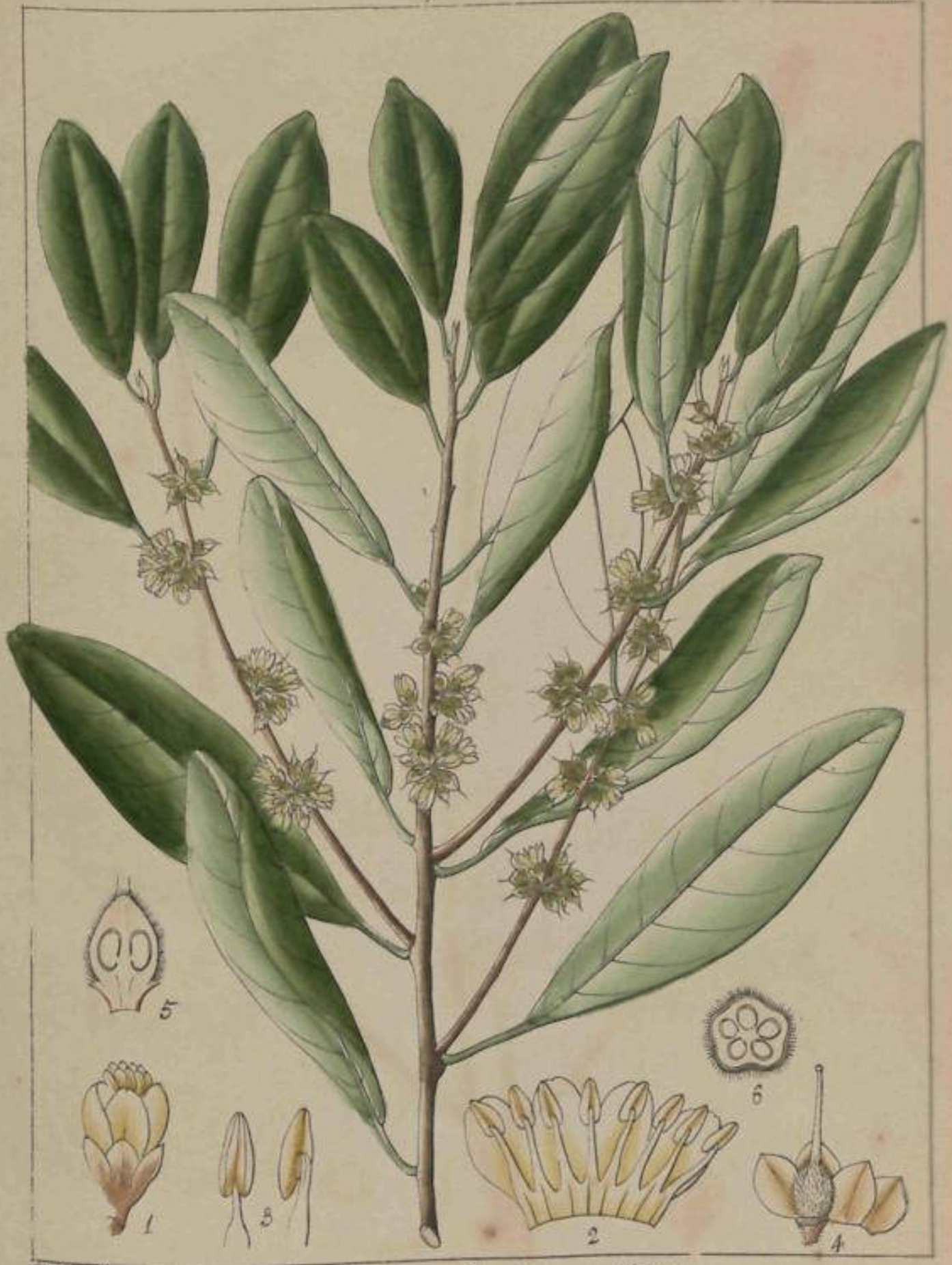
Ardesia humilis (Vahl)

Gerardine del.

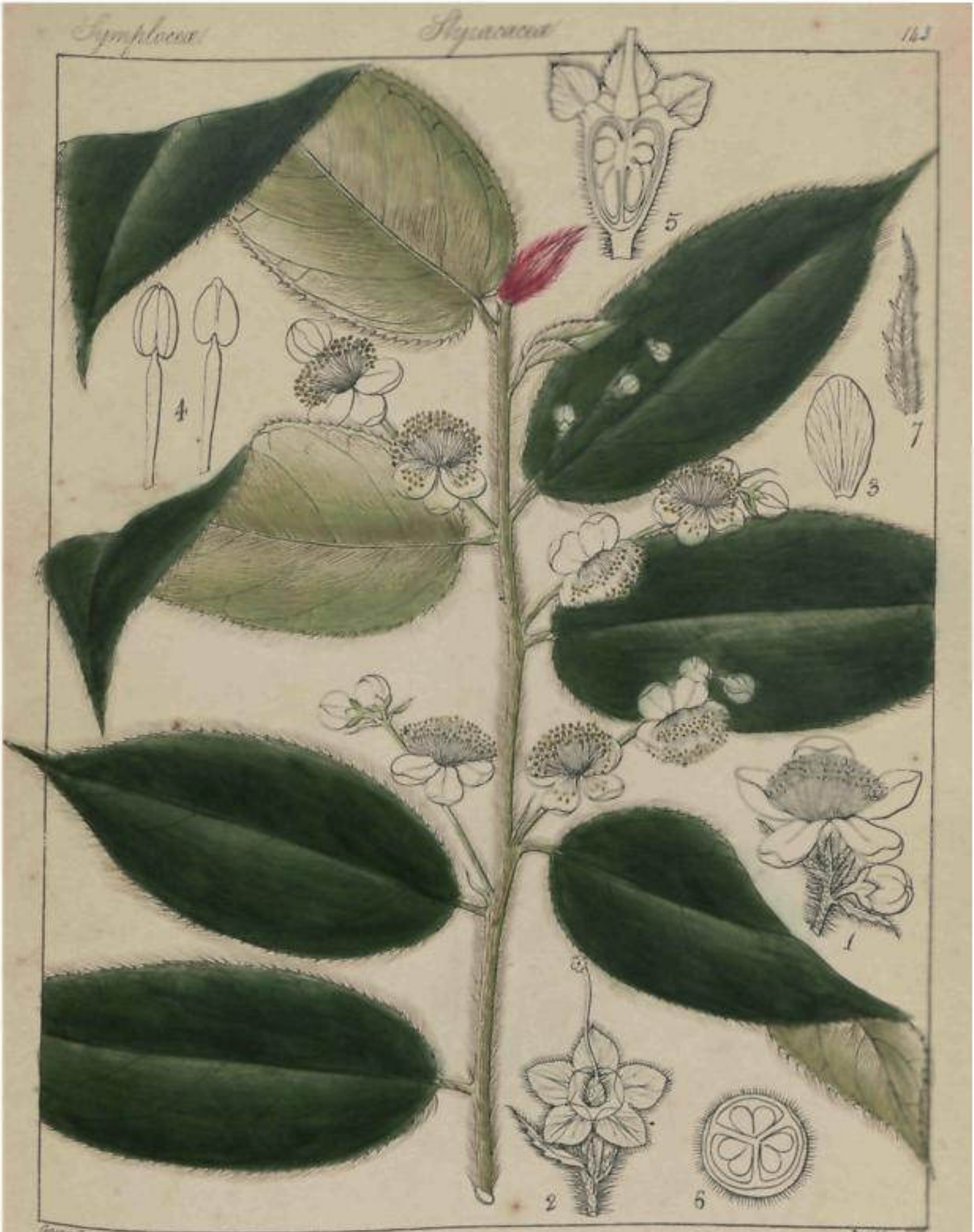
Ilex Wightiana (Wall)

Ilex Gardneriana (R. W.)

Sapota Elongoides (A.C. D.C.)



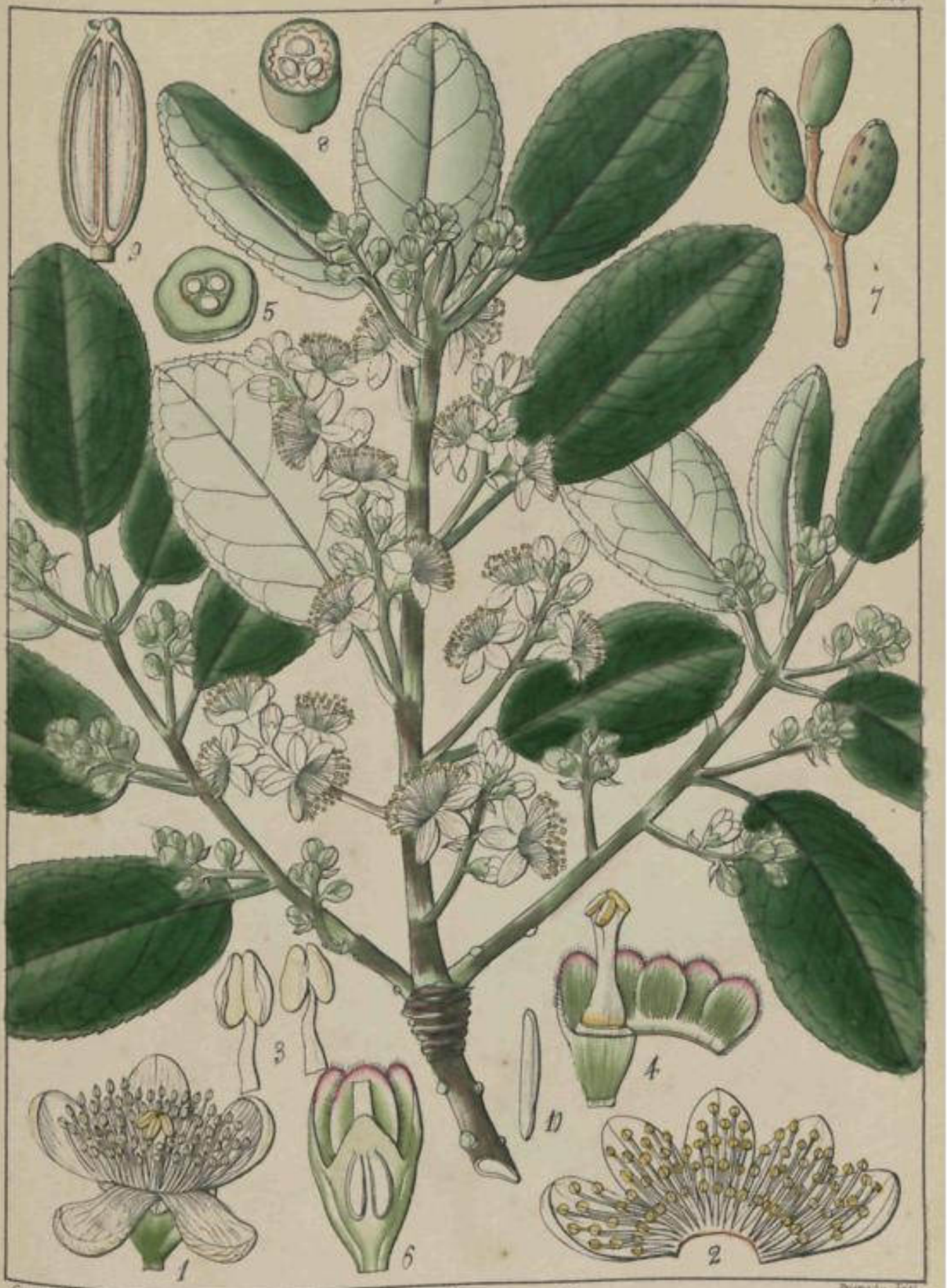
Isonandra Perrottetiana (A. DC.)



Symplocos pulchra (R. W.)

Symplocos Gardneriana (R. W.)

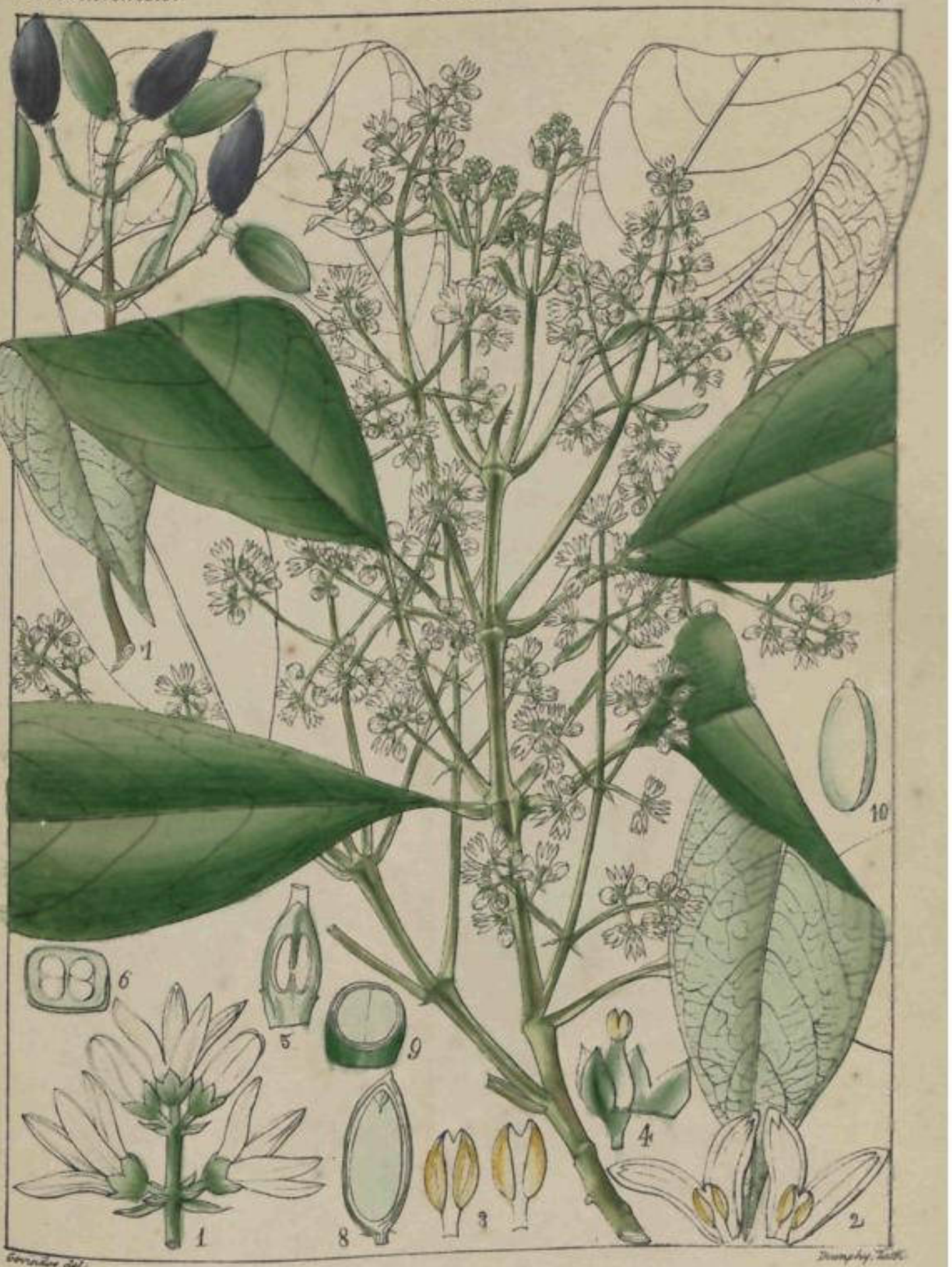
Symplocos microphylla (R W)



Simplocos obtusa (Wall.)

Olea robusta (Wall)
Visiania robusta (DC)

Ligustrum Nuilgherrense (R.W.)



Linociera intermedia (R.W.)

Jasminum unciflorum (Afzel. D.C.)

Jasminum revolutum (Lin.)

Ceropegia Draisneana (R. W.)

Ceropegia fusilla (W. & A.)

Terrandore del. Handay Lith.

Ceropegia ciliata [R. W.]

Ceropegia elegans (Wall.)

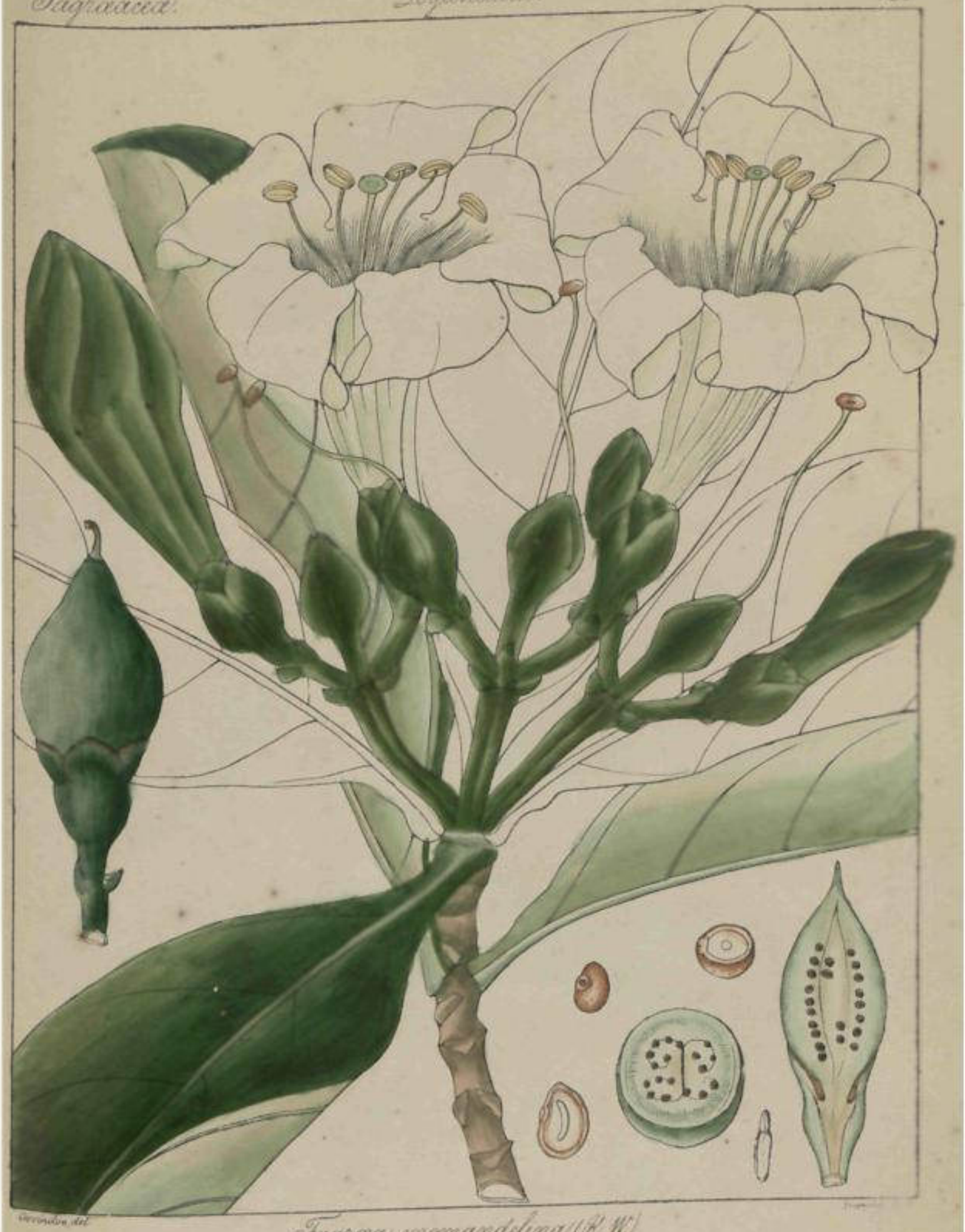
Brachylepis nervosa (W. & A.)

Wrightia Wallichii (A. & D. C.)

Govindoo del. Bauerfeind Sculp.

Carissa paucinervia (A.DC.)

Ophioxylon Wallicheanum



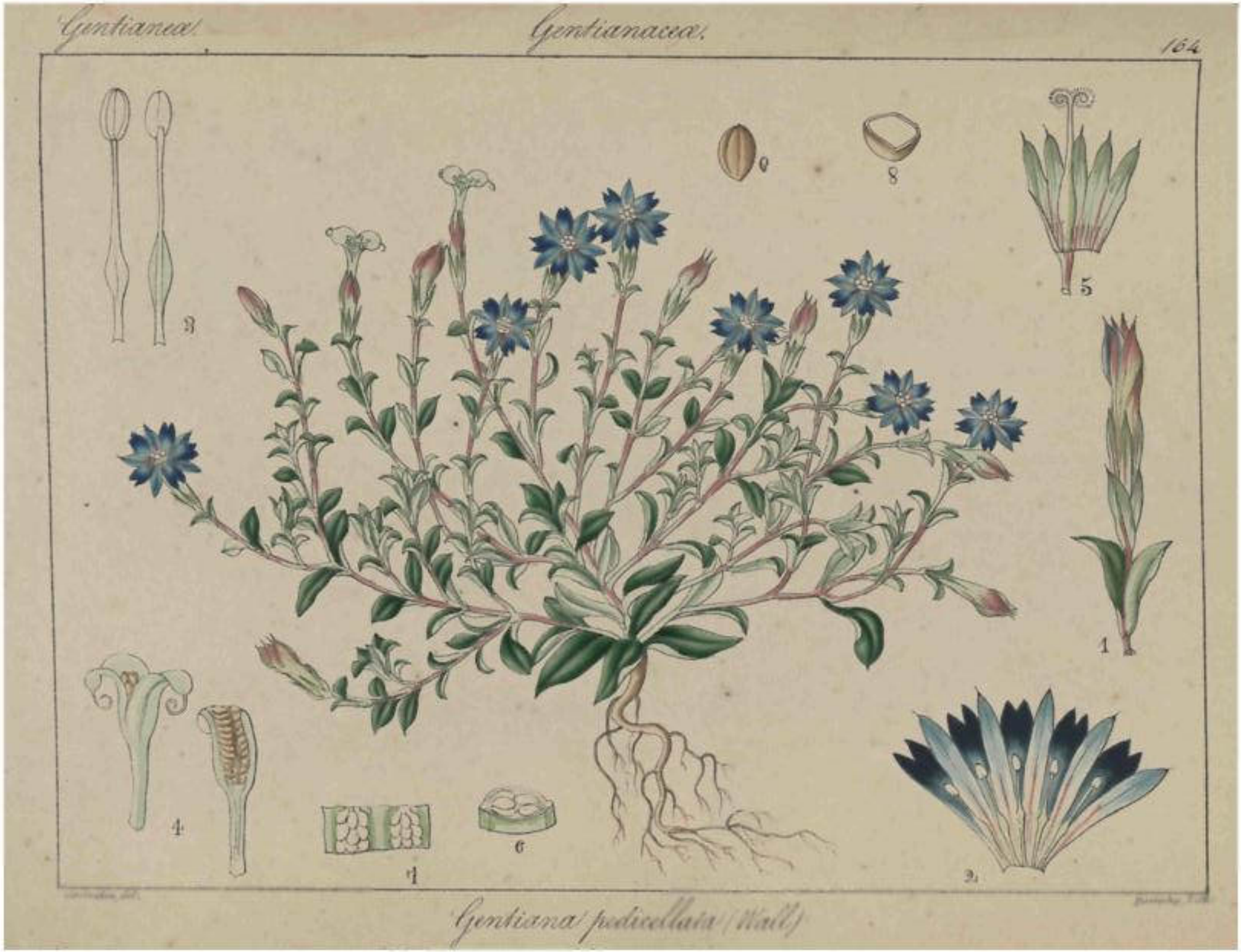
Fagraea coromandelina (R. W.)

Gardneria Wallichii (R.W.)

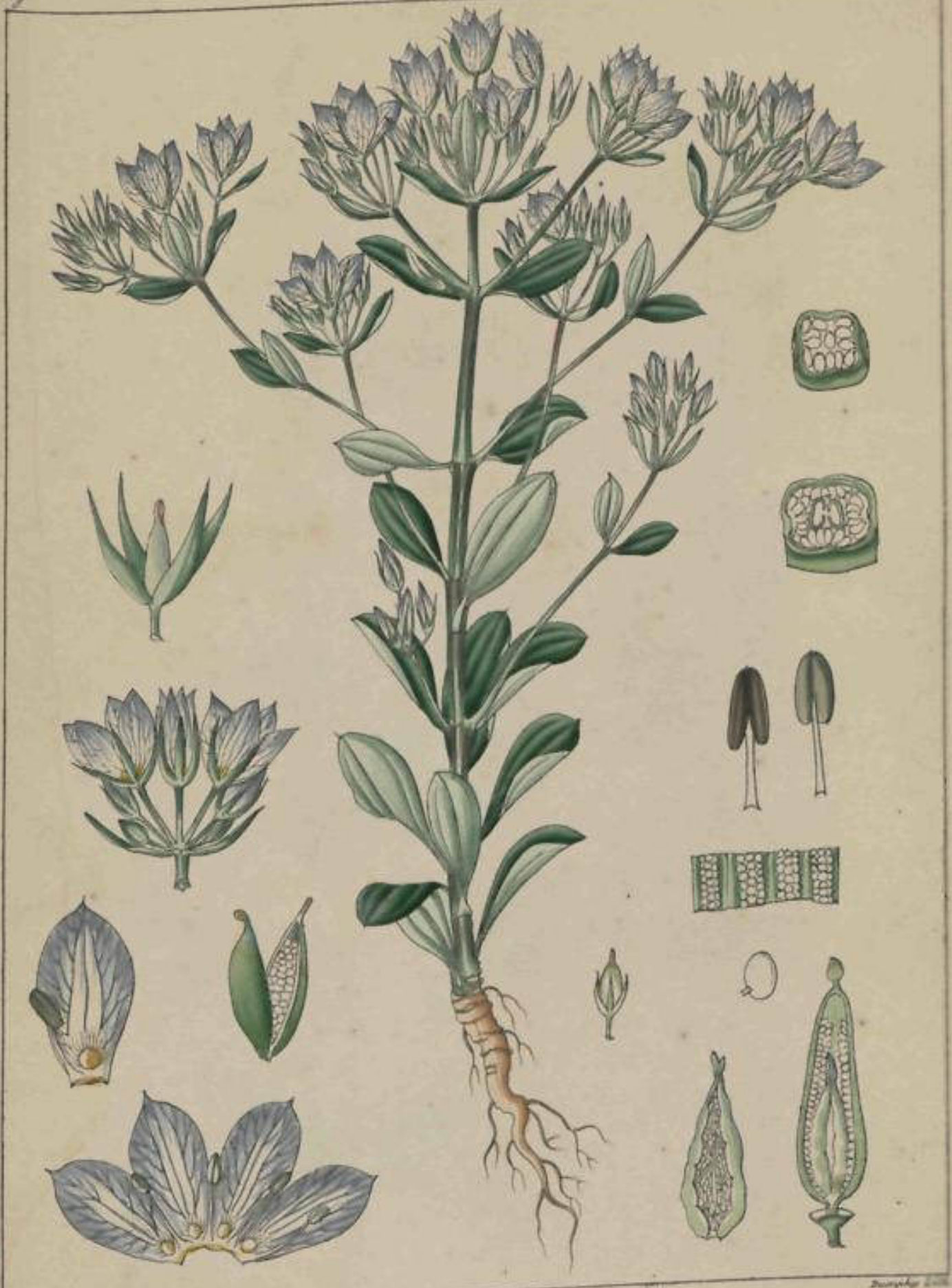
Cyrtandra del.

Exacum Perrottetii (Gaud.)

Exacum bicolor (Roxb)

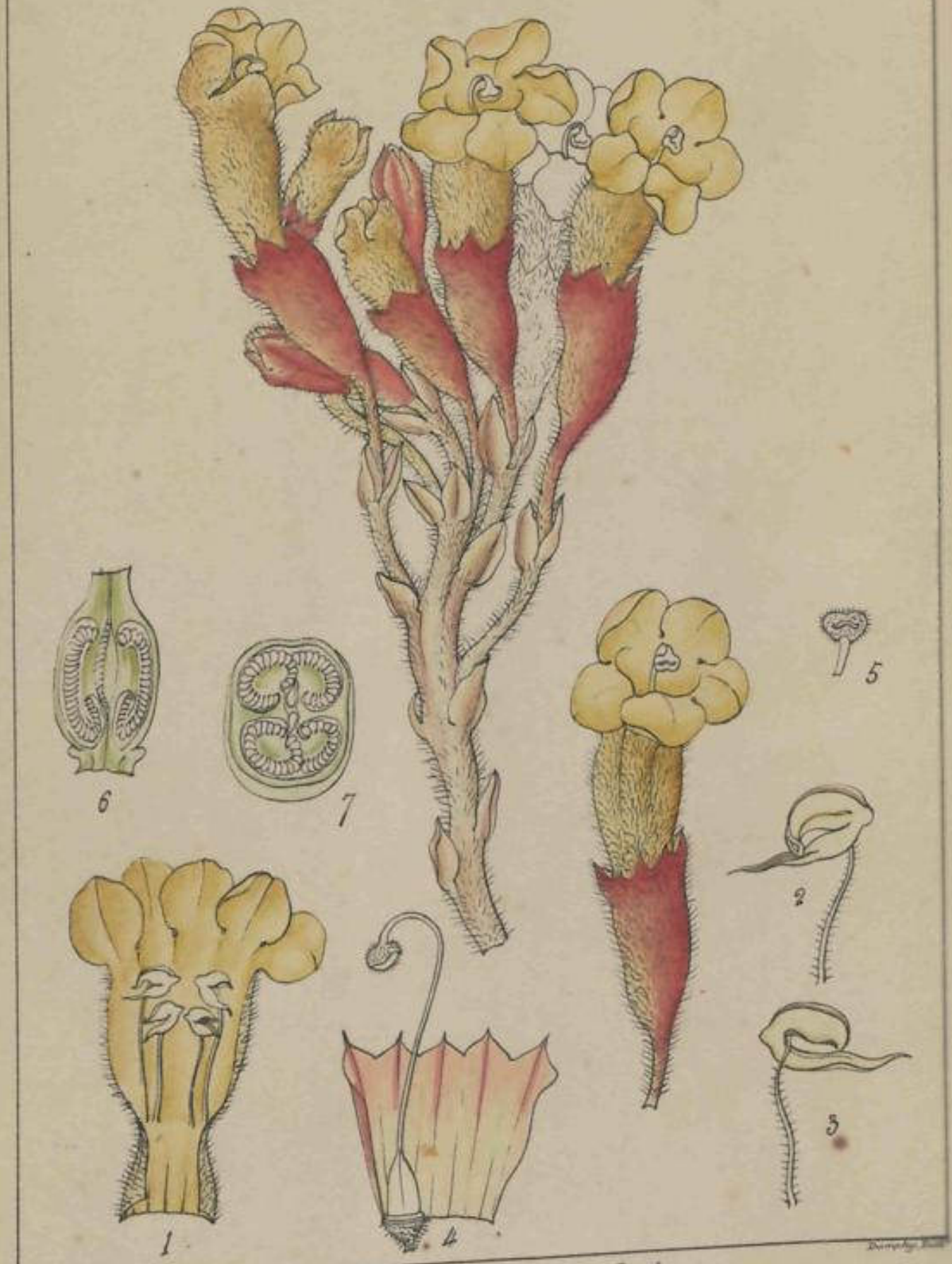


Gentiana pedicellata (Wall.)



Ophilia corymbosa (Grisel)

Halenia Perrottetia (Grisel.)

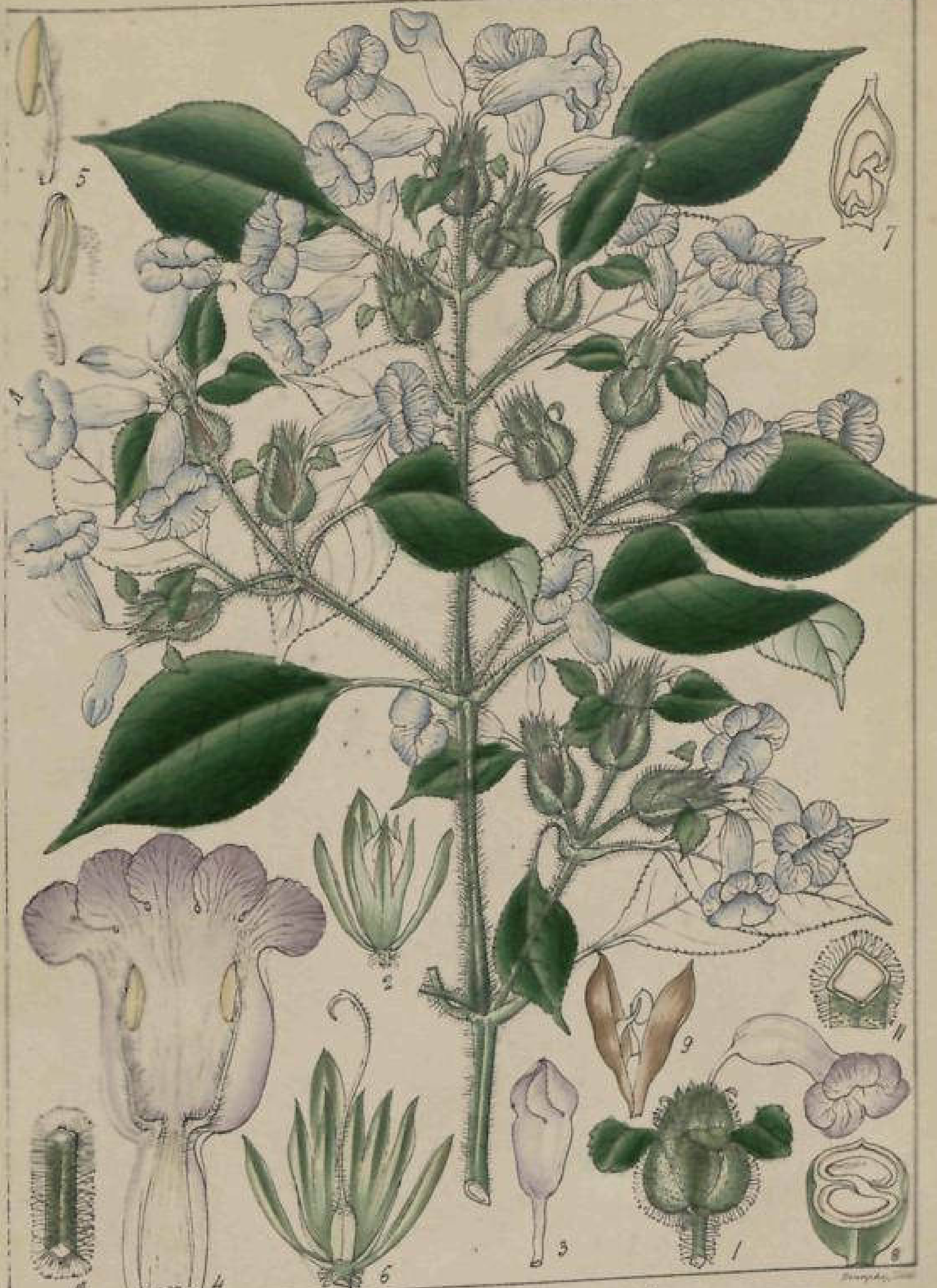


Christisonia aurantiaca (R. W.)

Gesneria del.

Didymocarpus tomentosa (R.W.)

Mergenia Hawtaniana (Nees)



Endopogon capitatus, Wall.

Endosiphon foliosus (R. W.)

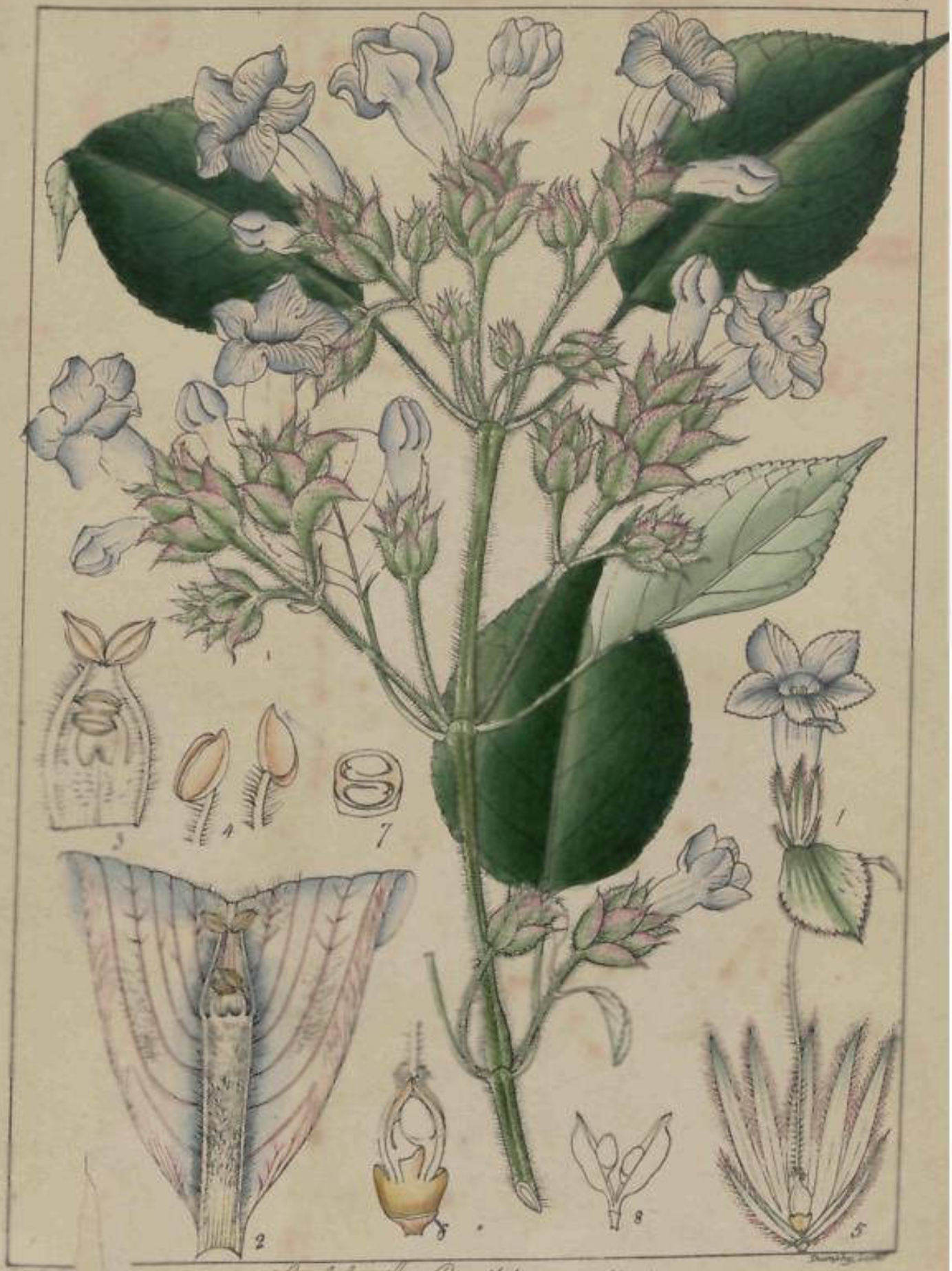
Endopogon sholidanthus (R.W.)

Asystasia coromandeliana (Nees)

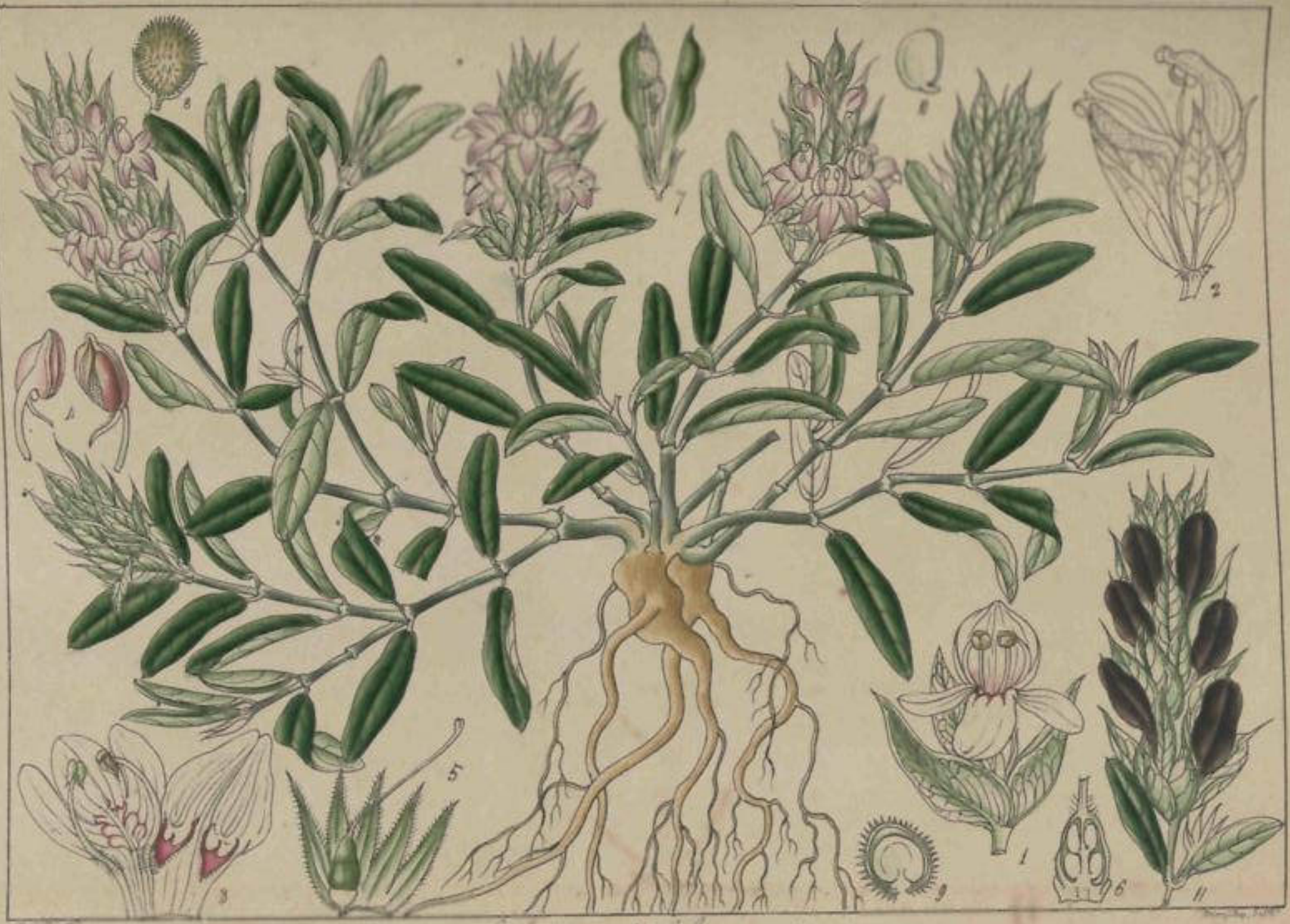
Leptacanthus Walkeri (Nees)

Goldfussia/ trisles (R.W.)

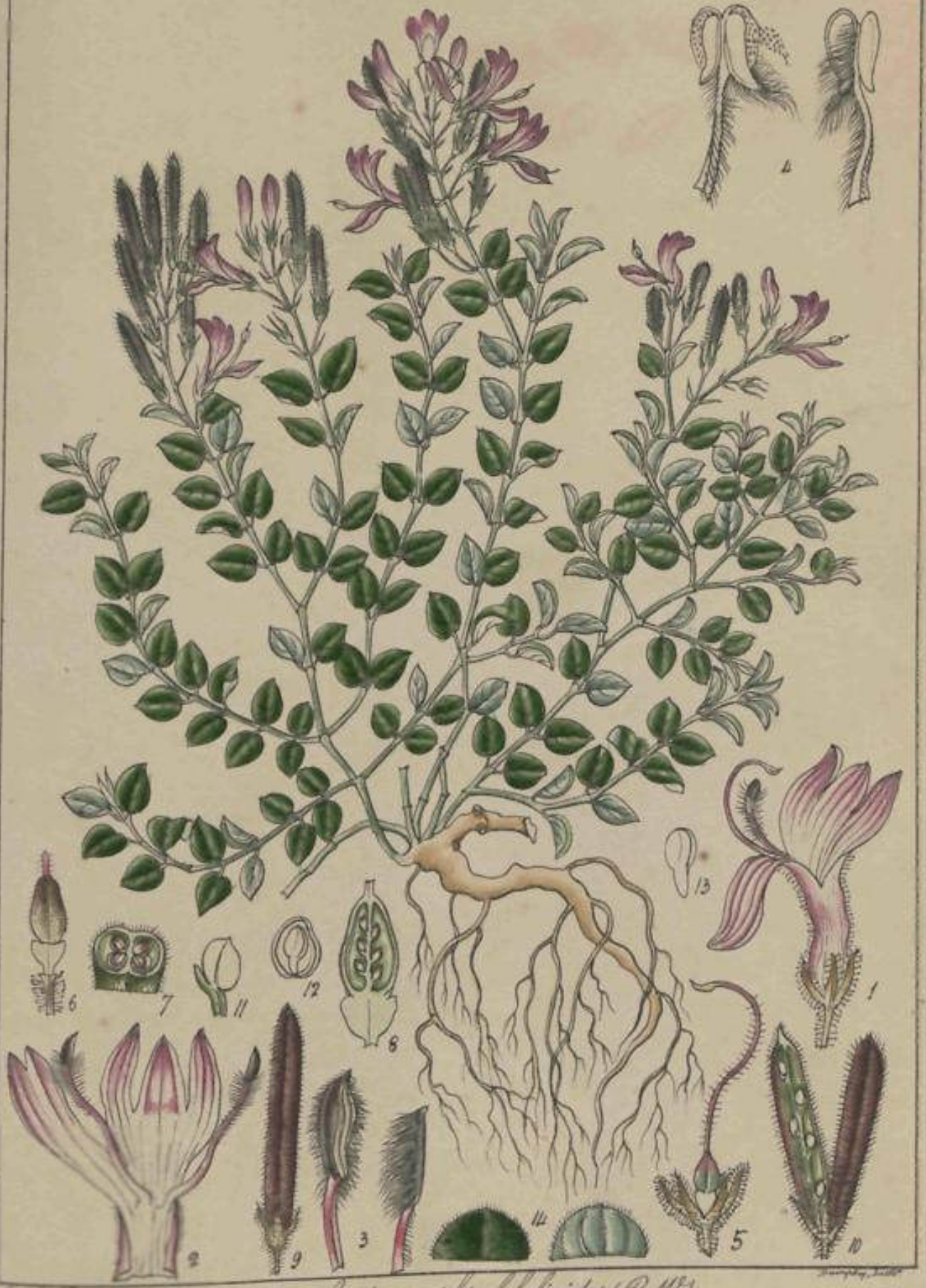
Strobilanthes sessilis (Nees)



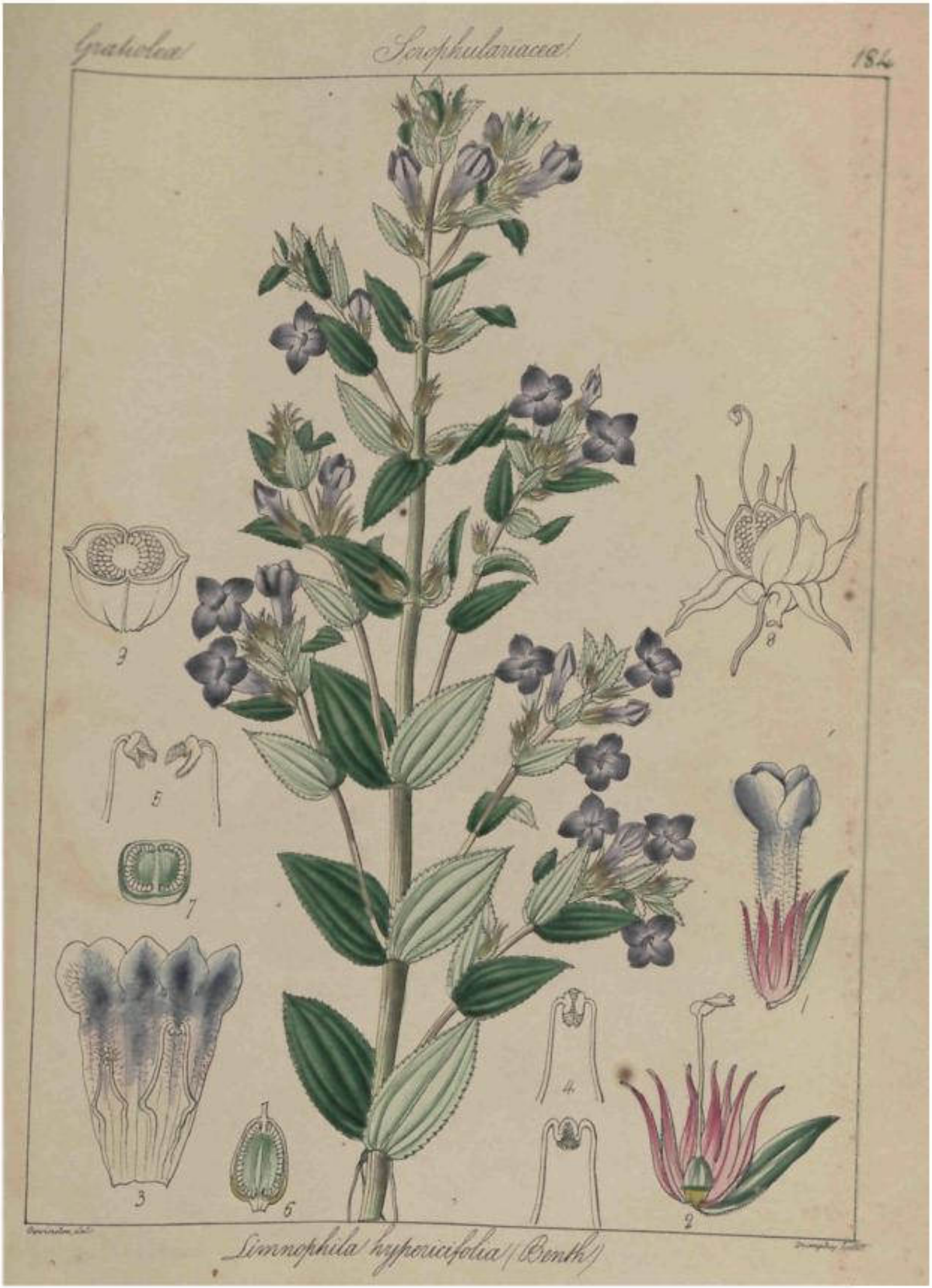
Strobilanthes Perrottetianus (Nees)



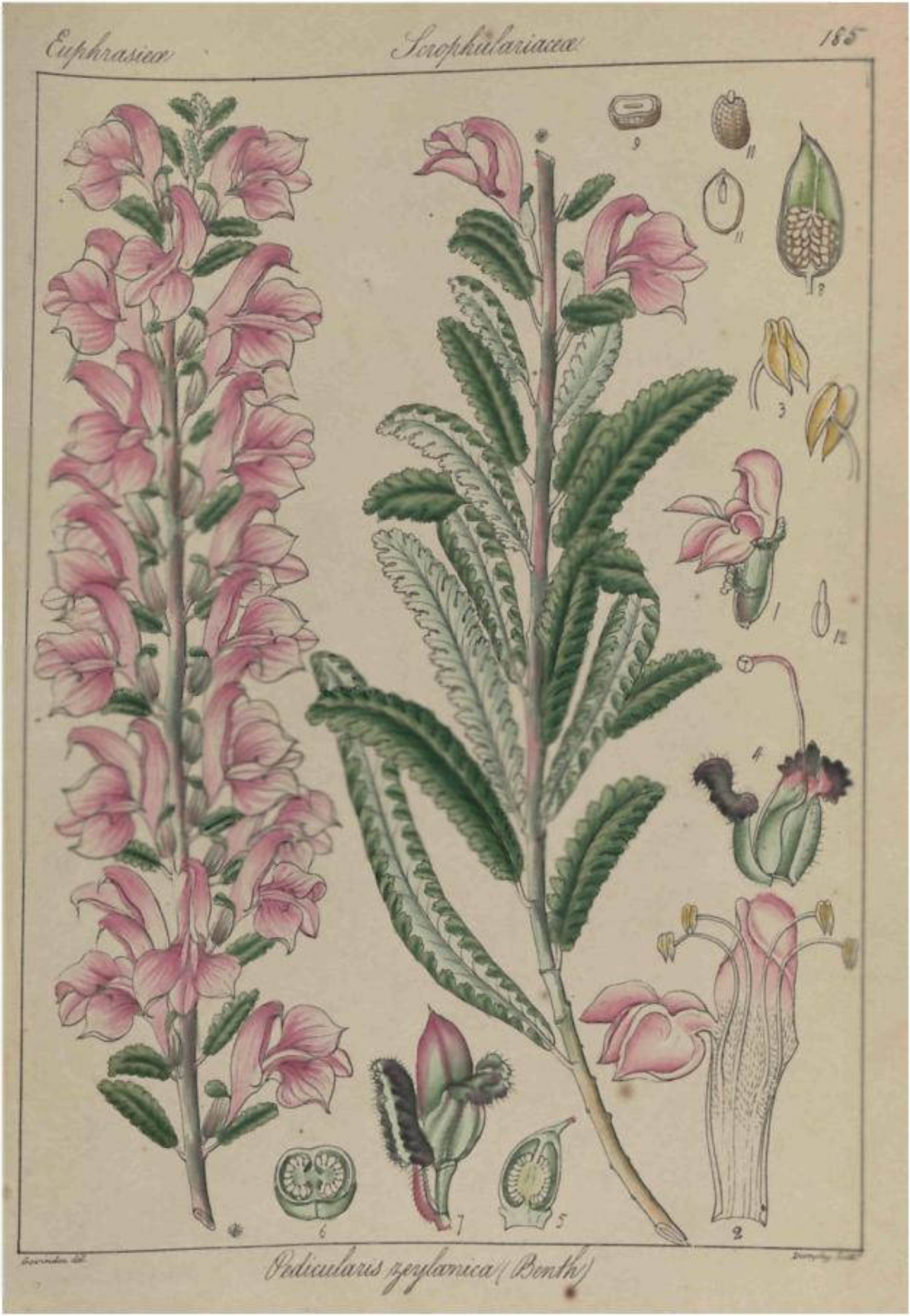
Adhatoda Neilgherica (Nees)



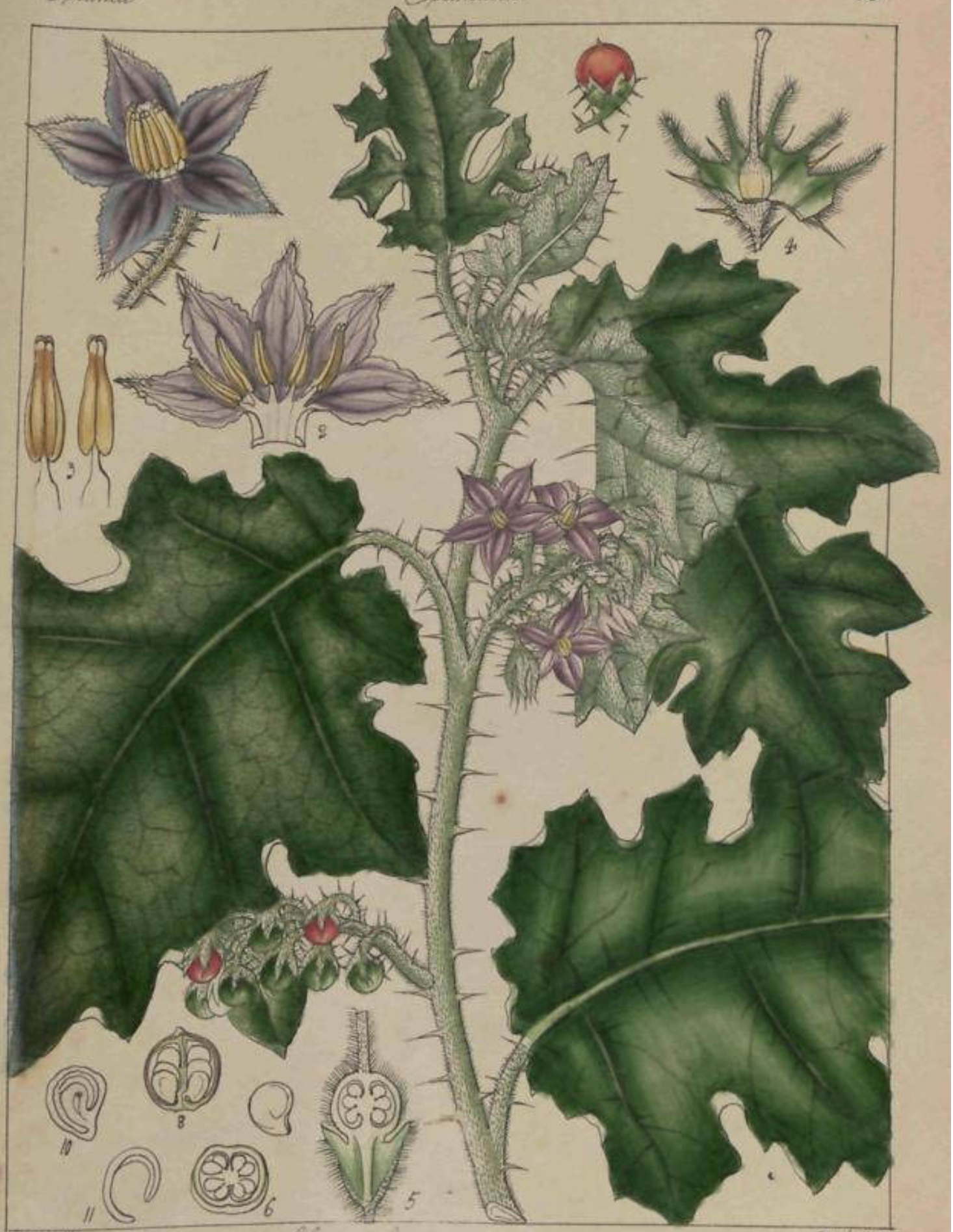
Andrographis lobelioides (R. W.)



Limnophila hypericiifolia (Benth.)



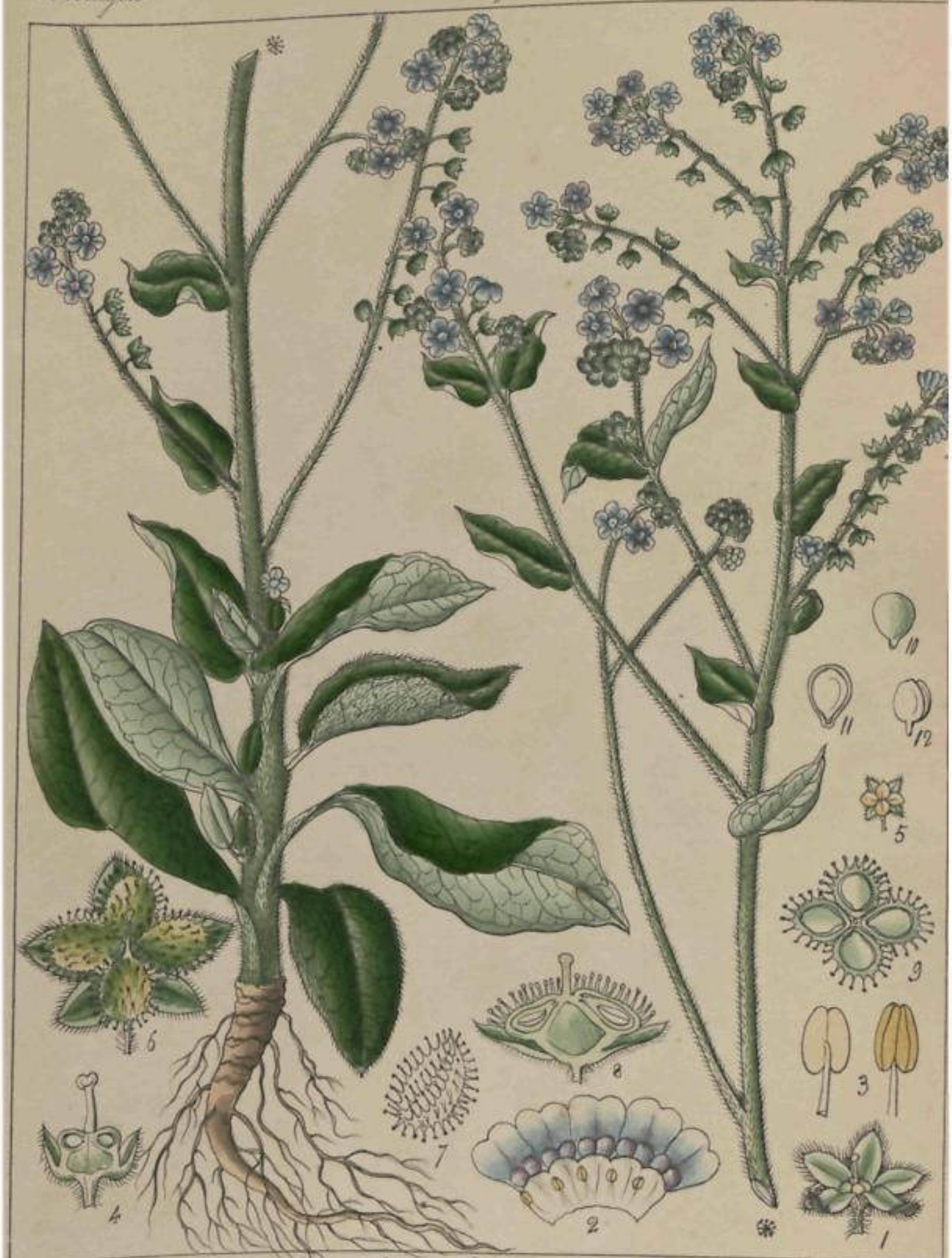
Pedicularis zeylanica (Benth.)



Solanum [illegible] (Nat.)

Convolvulus rufescens

Ehretia lævis (Roxb)



Cynoglossum furcatum (Wall)

Spurnforbea reticosa (R.W.)

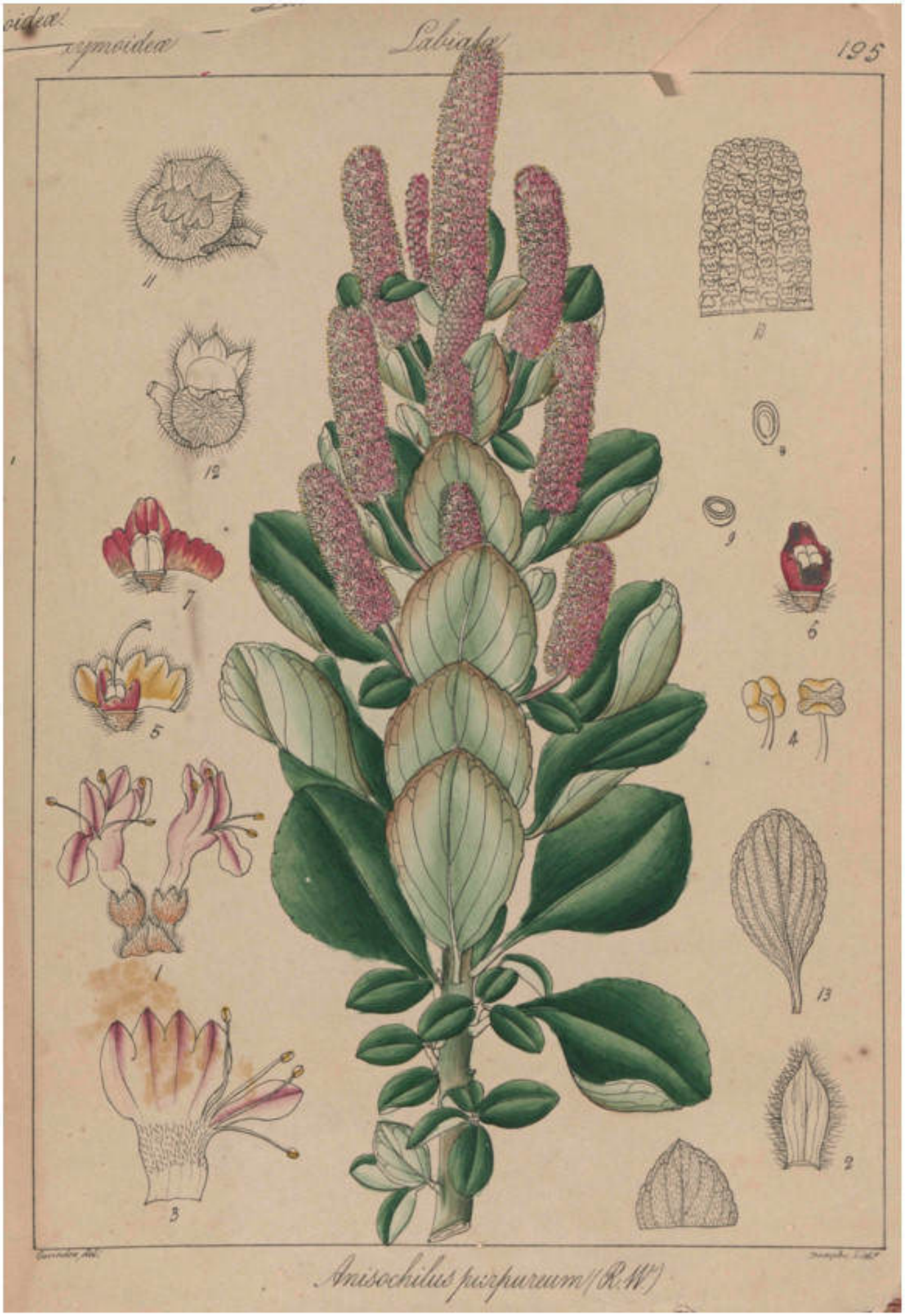
Lantana Indica (Roxb)

Clerodendron serratum (Spr.)

Gmelina arborea (Roxb.)

Prostemon rotundatus Benth.

Hieronima laevigata Benth.



Anisochilus purpureum (R.W.)

Pogostemon rotundatum Benth

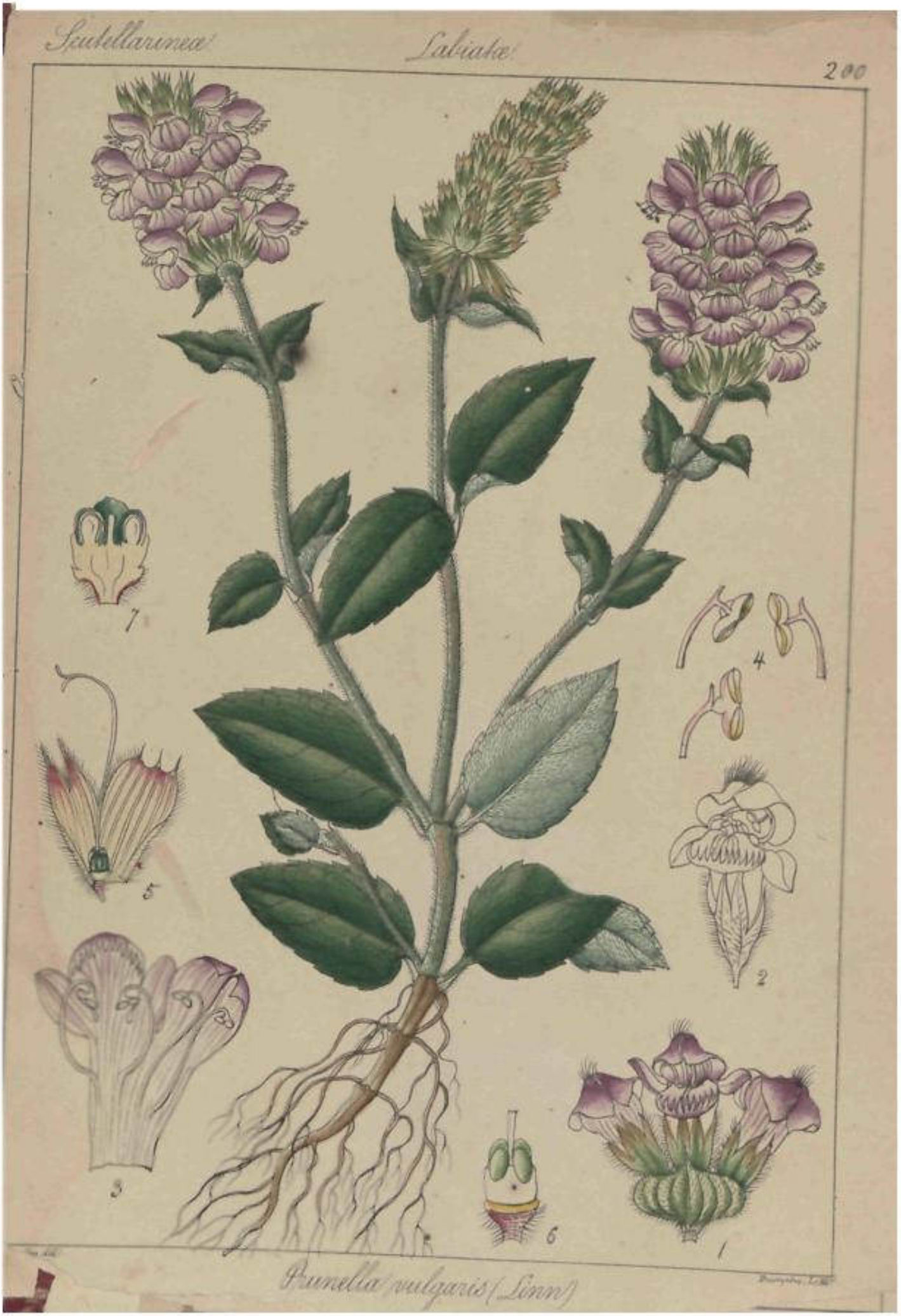
Micromeria biflora Benth

Pogostemon speciosum

Micromeria biflora Benth.

Micromeria biflora Benth.


Peltranthus Wightii (Benth.)



Prunella vulgaris (Linn.)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II
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II
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Teucrium (S.) tomentosum (Heyne)

17