WILD FLOWERS
OF
KASHMIR

THE DAL LAKE WHERE THE LOTUS LILIES GROW.

WILD FLOWERS OF KASHMIR

(SERIES I)

BY

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WITH DESCRIPTIONS AND
COLOURED ILLUSTRATIONS OF FIFTY SPECIES
REPRODUCED FROM
DIRECT COLOUR PHOTOGRAPHS.

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PREFACE.

KASHMIR, or more correctly the Jammu and Kashmir State, is situated in the north-west corner of India, in the Northern Hemisphere between latitudes 32° and 37° and longitudes 73° and 81° East of Greenwich. It comprises the westernmost portion of the great mountain range known as the Himalayas, which extending from the East across the North of India, terminate in the Western boundary of Kashmir at Nanga Parbat, one of the highest peaks in the world, with an elevation of nearly 27,000.' Its high mountain ranges with many peaks covered with the eternal snows are succeeded towards the south by lower ranges of hills which emerge on to the plains where the elevation is only 1500'. It is traversed by three of the great rivers of the Punjab, namely the Indus, Jhelum and Chenab rivers, which divide the country into three great valleys separated by high mountain ranges. The Indus valley, which includes Baltistan and Ladakh, forms the north and north-eastern portion of the country, much of which is very bare and desolate, with a rainfall considerably less than in the Jhelum and Chenab valleys. The upper portion of the Jhelum valley forms the Kashmir valley proper, which is a large plain sixty miles in length by about

twenty to thirty miles in width, at an elevation of 5000 feet, surrounded by high mountain ranges, with the Jhelum river, whose source is at the eastern end, flowing across it and finding an exit through the chain of mountains at Baramulla. The Chenab valley includes almost the whole of the Jammu province, which forms the southern portion of the State, and much of which towards the south consists of low, undulating, denuded hills.

Lakes at high elevations are frequent, and lower down in the Kashmir valley proper there is the great Wular Lake, eight miles in width, through which the Jhelum river flows, the Dal Lake close to Srinagar, and many large areas of swamplands.

With the great differences in elevation the climatic conditions vary from those of an arctic to those of a sub-tropical climate, and the vegetation is in consequence of an Alpine, temperate and sub-tropical type, the lakes and swamps also containing many aquatic plants. The vegetation of the Jhelum and Chenab valleys is of a similar type, but the vegetation of the Indus valley, owing to its drier climate, is of a more or less distinct type, and it is here as well as in the upper, drier parts of the Chenab valley that the Blue Pine (*Pinus excelsa*) is replaced by the Edible Pine (*Pinus Gerardiana*) which yields the "chilgoza nuts," which are the seeds obtained from the cones of the Edible Pine tree.

The tree growth shows four well-defined zones of vegetation due to difference in elevation, namely (i) The Phulai (*Acacia modesta*) and Olive (*Olea cuspidata*) Zone, from 1500′ to about 3000′, (ii) The Chir Pine (*Pinus longifolia*) Zone, from about 3000′ to 5000′, (iii) The Blue Pine (*Pinus excelsa*) Zone, from about 5000′ to 10,000′, which includes the Deodar and Fir forests, and (iv) the Birch (*Betula utilis*) Zone, from about 10,000′ to 12,000′. The tree growth ends with the Birch forests at about 12,000′, but herbaceous plants extend up to 14,000′, or to within a short distance of the perpetual snowline, the elevation of which varies according to the aspect. Of the total number of different kinds of wild flowers to be found in Kashmir, about two hundred and fifty species occur in Great Britain.

The illustrations in this book are reproductions from direct colour photographs of freshly gathered specimens, taken on Lumière's autochrome plates by the author, whose thanks are due to Messrs. Raithby, Lawrence & Co. for the excellent reproductions they have made from them.

The names of the plants are those given in Hooker's Flora of British India, and the same book has largely been made use of for the descriptions and distribution of the plants. For information with regard to the medicinal uses of some of the plants described, the book on Indian Medicinal Plants by Lt.-Colonel K. R.

Kirtiker, I.M.S., and Major B. D. Basu, I.M.S., has been consulted. Reference has also been made to Collett's "Flora Simlensis" and to Parker's "Forest Flora for the Punjab."

In the Introduction, for the benefit of those not acquainted with Botanical nomenclature, the names of the different parts of a typical flowering plant have been described, and an explanation has also been given of the Botanical terms used in the book, and a note has also been added on the system of classification.

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INTRODUCTION.

(a) NAMES OF THE DIFFERENT PARTS OF A FLOWERING PLANT.

A typical flowering plant consists of (1) Root, (2) Stem, (3) Leaves, and (4) Flower.

(1) **Root,** the underground part of a plant, whose function is to anchor the plant in the soil, and by means of its root-hairs to absorb water with certain mineral substances in solution which are necessary for the growth of the plant.

(2) **Stem,** the part of the plant which bears the leaves. It also serves as a channel for conducting water from the root to the leaves and other parts of the plant, and for the distribution of food material manufactured in the leaves.

> **Rootstock,** an underground stem, which is often short and thick, forming the crown of the root, from which the leaves grow in the case of a plant with no stem above ground bearing leaves.
>
> **Nodes,** the points on a stem at which the leaves are inserted.

(3) **Leaves.** A leaf consists of two parts, the stalk or **petiole,** and the flat extended portion termed the **blade** or **lamina.** Some leaves have no petiole and are then said to be **sessile.**

The function of leaves is to perform the work of a factory in manufacturing food material for the nourishment and growth of the plant, and also to act as breathing organs for obtaining oxygen from the air. Almost the whole solid substance of a plant is derived from material manufactured in the leaves from the carbon dioxide gas taken in by them from the atmosphere. The quantity of solid substance in a plant derived from material taken up in solution by the roots is very small in comparison with what has been derived from the carbon dioxide gas in the air through the activity of the leaves.

Leaflets, the separate component parts of a compound leaf.

Axil, the angle between the stem and base of a leaf.

Sheath, the expanded base of a petiole.

Rachis, the extension of the petiole in a compound leaf on which the leaflets are inserted.

Stipules, small scale-like or leaf-like organs at the base of a leaf.

(4) **Flower.** A typical flower consists of four kinds of differently modified leaves adapted for special functions, namely: (i) sepals, (ii) petals, (iii) stamens, and (iv) carpels.

(i) The **sepals** form the outermost whorl of floral leaves and collectively constitute the **calyx.** They are usually green and like small simple leaves. Their chief function is to protect the inner parts of the flower, especially whilst in bud.

(ii) The **petals** form the second whorl of floral leaves. They are usually bright-coloured, larger than the

sepals, and collectively they constitute the **corolla.** They may be free when the corolla is said to be **polypetalous,** or united together when the corolla is said to be **gamopetalous.** Their chief function is to act as a decoy to attract insects to visit the flower. In some flowers the lower portion of the petals is narrowed to a slender stalk which is termed the **claw,** the upper portion being termed the **limb.** In some flowers with a gamopetalous corolla the lower portion is tubular and termed the **corolla-tube,** the upper expanded portion being termed the **limb.** In the Natural Order *Compositæ* the outer flowers in the flower head of some species have part of the corolla prolonged and strap-like, which is termed the **ligule.**

(iii) The **stamens** come next to the petals, and are usually small slender organs, each consisting of a slender stalk termed the **filament,** and an upper thickened portion termed the **anther.** The anther is two-lobed and the portion of the filament connecting the two lobes is termed the **connective.** The anther contains a mass of minute round bodies termed **pollen-grains.** The stamens are the male organs of the plant.

(iv) The **carpels** are situated in the centre of the flower. A carpel consists of three parts, the lowermost usually thick and rounded portion termed the **ovary,** the central portion, which is often long and threadlike, termed the **style,** and the topmost portion, often like a pin's head, termed the **stigma.** The carpels collectively form the **pistil,** which may consist

of a single carpel, several free or several united carpels. The carpels are the female organs of the plant. The ovary contains one or more small bodies termed **ovules,** which when fertilised develop into seeds. The fertilisation of the ovules is brought about by the transference of pollen-grains from the anthers of the stamens to the stigma of the carpels, through the agency of insects or by the wind or other means. The bright colours and curious shapes of some flowers are adaptations to attract certain insects for the purpose of bringing about cross-fertilisation, the insects visiting the flowers to feed on the honey juices secreted in them, and in so doing unconsciously transferring pollen which adheres to their bodies from one flower to the stigma of another flower. An ovary after fertilisation of the ovules becomes enlarged and ripens to form the fruit containing the seeds or ripened ovules, but other parts such as the calyx often take part in forming what is usually called the fruit.

Perianth. The sepals and petals together are termed the perianth. The term is usually employed when there is little distinction between the sepals and petals, or when one of these whorls is absent.

Peduncle, the stalk of a flower or cluster of flowers.

Pedicel, the stalk of a single flower, when the peduncle bears several flowers.

Rachis, the extension of the peduncle along which the flowers are arranged.

Scape, the special name for a leafless flower stalk when it grows directly from the rootstock.

Receptacle, the top of the peduncle inside the calyx on which the parts of the flower are inserted.

Disk, a protuberance from the receptacle which is usually annular and cushion-like between the calyx and carpels.

Bracts, small scale-like or leaf-like organs immediately beneath a flower or cluster of flowers, or on the peduncle or pedicel. When several bracts are together in a whorl below a head of flowers or umbel they constitute the **involucre.**

Bracteoles are small bracts. A small cup-like body formed from several united bracteoles enclosing the base of a flower is termed an **involucel,** as in the Natural Order *Dipsaceæ.*

(b) EXPLANATION OF THE BOTANICAL TERMS USED.

Achene, a small, dry, one-seeded fruit.

Acuminate, when the apex of a leaf is suddenly narrowed and then prolonged to a long point.

Acute, when the apex of a leaf is sharp-pointed or forms a narrow angle.

Adnate, when dissimilar parts are united.

Alternate, when the leaves are arranged singly at the nodes and not in pairs or whorls of several leaves at the same node.

Axillary, when growing from the axil of a leaf.

Berry, a succulent fleshy fruit with seeds embedded in the fleshy pulp.

Campanulate, bell-shaped.

Capitate, with a rounded head.

Capsule, a dry fruit which splits open whilst on the plant to set the seeds free, formed from several united carpels.

Cauline, when inserted on the stem.

Clawed, when the lower part of a petal is narrowed to a slender stalk.

Compound, when a leaf is divided to the petiole or midrib into several distinct leaflets.

Connate, when the bases of two opposite leaves are united.

Cordate, when the base of a leaf is produced downwards, forming a rounded lobe on each side of the petiole, *e.g.* heart-shaped.

Corymb, when the pedicels start from different points and attain the same level, the lower ones being longer than the upper ones, so that the flowers are at the same level.

Digitate, when the leaflets of a compound leaf all spring from the top of the petiole like the fingers of a hand.

Drupe, a succulent fruit in which the inner wall of the ovary has become hard and woody enclosing the seed, forming what is commonly called the stone of the fruit. The kernel inside the stone is the seed.

Entire, when the margin of a leaf is not cut into teeth or lobes.

Exstipulate, without stipules.

Fascicle, arranged in a bunch.

Follicle, a fruit formed from a single carpel, which when ripe splits open down one side only.

Glabrous, smooth without any hairs.

Hastate, like a spear-head.

Inferior, an ovary is said to be inferior when it is adnate to the calyx tube with the petals and stamens inserted above it.

Lanceolate, when a leaf is about three times or more as long as broad, broadest below the middle, and the summit tapering to a point, *i.e.* like a lance head.

Linear, when a leaf is long and narrow and of more or less equal width throughout its length.

Mucronate, when the apex of a leaf abruptly terminates in a short sharp point.

Ob-lanceolate, when a leaf is about three times or more longer than broad, broadest above the middle, and the lower part tapering to a point.

Ob-ovate, when a leaf is scarcely twice as long as broad, and broader above the middle.

Obtuse, when the apex of a leaf is blunt, rounded or wide-angled.

Odd-pinnate, when a leaf is pinnate, with an odd terminal leaflet.

Opposite, when two leaves grow from the same node on opposite sides of the stem.

Orbicular, when a leaf is of a circular shape.

Ovate, when a leaf is scarcely twice as long as broad, and broader below the middle.

Ovoid, when a solid body is oval in outline.

Panicle, when the rachis divides into branches bearing two or more flowers.

Pappus, the name of a calyx consisting of long hairs, as in the Natural Order *Compositæ*.

Persistent, when the calyx does not fall early, but remains until the fruit is mature.

Petaloid, when the sepals are like petals.

Pinnate, when the leaflets of a compound leaf are arranged on each side of the rachis, like the branches on a feather.

Pinnatifid, when a simple leaf is deeply cut into lobes arranged like the leaflets of a pinnate leaf.

Pubescent, with soft, short hairs.

Raceme, when the flowers are borne on pedicels along an undivided rachis.

Radical, when the leaves grow direct from the root-stock.

Rotate, when the lobes of a corolla spread out horizontally from a short tube, like a wheel.

Sagittate, when a leaf has two basal pointed lobes directed downwards, like an arrow head.

Salver-shaped, when the corolla has a long cylindrical tube surmounted by a flat expanded limb, similar to rotate except that the corolla tube is long.

Serrate, when the margin of a leaf has sharp teeth like a saw.

Sessile, without a stalk.

Simple, when a leaf is undivided into separate leaflets.

Spike, when the flowers are sessile along a simple undivided rachis.

Superior, when the ovary is free from the calyx and the petals and stamens are inserted below it.

Ternate, when a compound leaf is divided into three separate leaflets springing from the same point.

Truncate, when the apex is abruptly cut off.

Umbel, when several pedicels radiate from the top of a peduncle, and are all of about the same length.

Valvate, when the margins of the sepals meet together without overlapping each other.

Whorl, when several leaves or other organs are arranged in a circle round a central axis.

(c) CLASSIFICATION.

There are many different kinds of wild flowers, and each different kind in more scientific language is said to be a different species. All the wild flowers of the same kind—that is, with identically the same characters, evidently all being descended from the same ancestor—constitute a species, which has originated with this ancestor. How these ancestral types or species have come into existence is a subject upon which information may be found in Darwin's "Origin of Species" and the later books on Mendelism.

The species is the unit from which the classification of plants is built up. Those species which only differ in minor details, but in other respects have a very close resemblance to one another, indicating a close relationship, are grouped together to form a *genus*. Those genera which have certain characters in common, especially with regard to the structure of the flower, and are in consequence considered to be not very distantly related, are grouped together to form a *Family or Natural Order*.

The scientific name of a plant consists of two words, usually of Latin or Greek derivation, the first word being the name of the genus to which it belongs and the second word indicating the species.

The first two plants illustrated in this book are *Clematis grata* and *Clematis connata*. If these two plants are compared with one another, it will be seen that they differ in only minor details, such as a slight difference in their leaves and sepals, but in other respects they bear a very close resemblance to one another. They are two different species, but both of the same genus Clematis. The next plant illustrated is *Anemone obtusiloba*, and if this is compared with a species of Clematis it will be found to be quite a different looking plant. It is a small herb, with only radical leaves and the flowers borne on a leafless scape, whereas the Clematis is a tall climber, with large pinnate leaves on the stem and the flowers in large panicles. They evidently cannot be very closely related and so cannot belong to the same genus. If, however, the flowers of the two plants be closely

compared, it will be found that their structure is identically the same. They both have free sepals (which are like petals), a large number of stamens, and a considerable number of free carpels which ripen to achenes (small, dry, one-seeded fruits). From the structure of the flowers being identical they evidently bear some relationship to one another and consequently are both classified into the same Natural Order, *Ranunculaceæ*; for it is the structure of the flower which determines the classification into Natural Orders.

The classification does not end with the Natural Orders, and the following key will show how the Natural Orders represented in this book are arranged into classes, sub-classes and series:—

Class I. ***Dicotyledons.*** Plants with the parts of the flowers in fours or fives or multiples of these; leaves with the veins branching in network manner; two cotyledons (rudimentary leaves) to the embryo in the seed.

Sub-class 1. ***Polypetalæ.*** Petals not united.

Series (i). ***Thalamifloræ.*** Parts of the flower inserted on the receptacle.

Natural Orders
1. Ranunculaceæ.
2. Berberideæ.
3. Nymphæaceæ.
4. Papaveraceæ.
5. Malvaceæ.

Series (ii). ***Disciflorae.*** Parts of the flower (petals and stamens) inserted on a disk.

Natural Orders
6. Geraniaceæ.
7. Rutaceæ.

Series (iii). ***Calycifloræ.*** Parts of the flower (petals and stamens) inserted on the calyx.

Natural Orders
8. Rosaceæ.
9. Saxifragaceæ.
10. Crassulaceæ.

Sub-class 2. ***Gamopetalæ.*** Petals united.

Series (i). With the ovary inferior.

Natural Orders
11. Dipsaceæ.
12. Compositæ.
13. Campanulaceæ.

Series (ii). With the ovary superior.

Natural Orders
14. Ericaceæ.
15. Primulaceæ.
16. Gentianaceæ.
17. Polemoniaceæ.
18. Borragineæ.
19. Solanaceæ.
20. Lentibularieæ.
21. Labiatæ.

Sub-class 3. ***Monochlamydeæ.*** Plants with no perianth, or either the calyx or corolla absent.

Series (i). With the ovary inferior.

Series (ii). With the ovary superior.

Natural Orders
22. Phytolaccaceæ.
23. Thymeliaceæ.

Class II. ***Monocotyledons.*** Plants with the parts of the flower in threes or multiples of three; veins of the leaf more or less parallel; one cotyledon to the embryo in the seed.

Sub-class 4. ***Petaloideæ.*** The perianth with at least one whorl like petals.

Series (i). With the ovary inferior.

Natural Orders { 24. Hydrocharideæ.
25. Orchideæ.

Series (ii). With the ovary superior.

Natural Order ... 26. Liliaceæ.

An index showing the species illustrated in this book, classified into their Natural Orders, is given at the end of the book.

CLEMATIS GRATA, *Wall.*

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is derived from the Greek word "*Klema*," a vine-twig, evidently referring to the twining character of the leaf-stalks. The plant resembles and is closely allied to the British species *C. vitalba*, which is known as the "traveller's joy" or "old man's beard," the latter name referring to the curious beard-like appearance of the fruits with their long feathery styles.

Description. A perennial, tall, robust climber, climbing by means of the petioles of the leaves which become tightly twisted round their support, with divided leaves and panicles of small cream-coloured flowers. The flowers have no petals, but the sepals have the colour and form of petals and spread out horizontally or downwards.

Stem, tough and woody.

Leaves, exstipulate, opposite, odd-pinnate, with twining petioles, leaflets usually 5 (but sometimes 3 or 7), toothed, hairy on both surfaces.

Flowers, ¾-1″ in diam., cream coloured, in terminal and axillary panicles.

Sepals, 4 (sometimes 5 or 6), petaloid, spreading horizontally or downwards from their bases.

Petals, 0.

Stamens, many, with glabrous filaments.

Carpels, many, free, each with a single ovule.

Fruit, a cluster of small dry bodies, termed achenes, each surmounted with a long feathery style of 1–1½″ in length.

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Stem, tough and woody.

Leaves, exstipulate, opposite, odd-pinnate, with twining petioles, leaflets usually 5 (but sometimes 3 or 7), toothed, hairy on both surfaces.

Flowers, ¾-1″ in diam., cream coloured, in terminal and axillary panicles.

Sepals, 4 (sometimes 5 or 6), petaloid, spreading horizontally or downwards from their bases.

Petals, 0.

Stamens, many, with glabrous filaments.

Carpels, many, free, each with a single ovule.

Fruit, a cluster of small dry bodies, termed achenes, each surmounted with a long feathery style of 1–1½″ in length.

Distinguishing characters. Flowers in panicles, sepals spreading horizontally or downwards from their bases, filaments glabrous. The only other Kashmir species with these characters is *C. gouriana*, which may be distinguished as follows:—

C. grata. Flowers usually exceeding $\frac{1}{2}$″ diam. Leaves hairy on both surfaces. Leaflets toothed.

C. gouriana. Flowers $\frac{1}{3}$-$\frac{1}{2}$″ diam. Leaves usually glabrous or softly hairy on the young parts or on the nerves on the undersurface. Leaflets without teeth or only few distant teeth.

Flowering Season. August, September.

Locality. Usually at fairly low elevations, 3–6000′, in open sunny situations, overtopping shrubs and low trees, *e.g.* Sindh valley.

Distribution. Sub-tropical and Temperate Himalaya from the Indus to Kumaon, 2–8000′; Afghanistan, China, N. Africa.

CLEMATIS GRATA, *Wall.*

CLEMATIS CONNATA, *DC.*

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is derived from the Greek word "*Klema*," a vine-twig, referring to the twining nature of the leaf-stalks. The specific name "*connata*" refers to a character of the leaves, the bases of two opposite leaf-stalks often being united, which is termed "connate" in Botanical language.

Description. A perennial, tall, robust climber, climbing by means of the leaf-stalks which twine tightly round their support, divided leaves, and panicles of yellowish cream coloured flowers of about 1″ in length. The flowers have no petals, but the sepals have the colour and form of petals and stand up erect (not spreading as in *C. grata*), with their tips sharply bent back.

Stem, tough and woody.

Leaves, exstipulate, odd-pinnate, opposite, with the bases of the petioles often united and sometimes forming a flat expansion. **Leaflets,** 3 7, coarsely toothed, glabrous.

Flowers, yellowish cream coloured, about 1″ in length, in many flowered panicles.

Sepals, 4, petaloid, erect with recurved tips, not ribbed.

Petals, 0.

Stamens, many, filaments hairy.

Carpels, many, free, each with a single ovule.

Fruit, a cluster of small dry bodies termed achenes, each with a long feathery style 1½ 2″ in length.

Distinguishing characters. Flowers in panicles, sepals erect with recurved tips, filaments hairy.

There is only one other species with these characters, namely *Clematis Buchananiana*, which is very closely allied, but its occurrence in Kashmir is doubtful. It may be distinguished as follows:—

C. connata. Leaflets glabrous, sepals not ribbed.

C. Buchananiana. Leaflets hairy on the lower surface, sepals ribbed.

Flowering Season. August, September.

Locality. Usually at fairly low elevations, 4--7000′, *e.g.* Ferozepore nala below Gulmarg; on the roadside between Baramulla and Rampur, and throughout the valley.

Distribution. Throughout the Temperate Himalaya from the Indus to Sikkim, 4–10,000′.

CLEMATIS CONNATA, *DC.*

ANEMONE OBTUSILOBA, *Don.*

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is derived from the Greek word "*Anemos*," the wind, referring to the exposed situations in which some species grow.

Description. This is the commonest of the Anemones. It is a perennial with only radical leaves (*i.e.* growing from the rootstock) and leafless flowering stems bearing 1 to 3 white, blue or, at high altitudes, yellow flowers of about 1″ in diameter.

Leaves, all radical, long petioled, 2–3″ diam., divided into 3 segments.

Flowering stems, 4–12″ in length, bearing 1 to 3 pedicelled flowers, with involucral bracts at the base of the pedicels.

Involucral bracts, small up to 1¼″ length, sessile, free, 3-fid.

Flowers, ¾–1¼″ diam., white with the lower portion on the outside almost invariably tinged with blue-purple or lead colour, frequently deep blue and at high elevations yellow. The pedicels are long and slender.

Sepals, usually 5 (sometimes more), petaloid.

Petals, 0.

Stamens, many.

Carpels, many, free, each with a single ovule.

Fruit, a cluster of many achenes, which are not imbedded in wool.

Distinguishing characters. Leaves deeply divided into 3 segments, which are usually sessile. Flowering stems bearing not more than 1 to 3 flowers, not branched, and usually less than 12″ in length. The involucral bracts not united below; flowers ¾–1¼″ diameter. Rootstock not tuberous; ripe achenes not imbedded in wool.

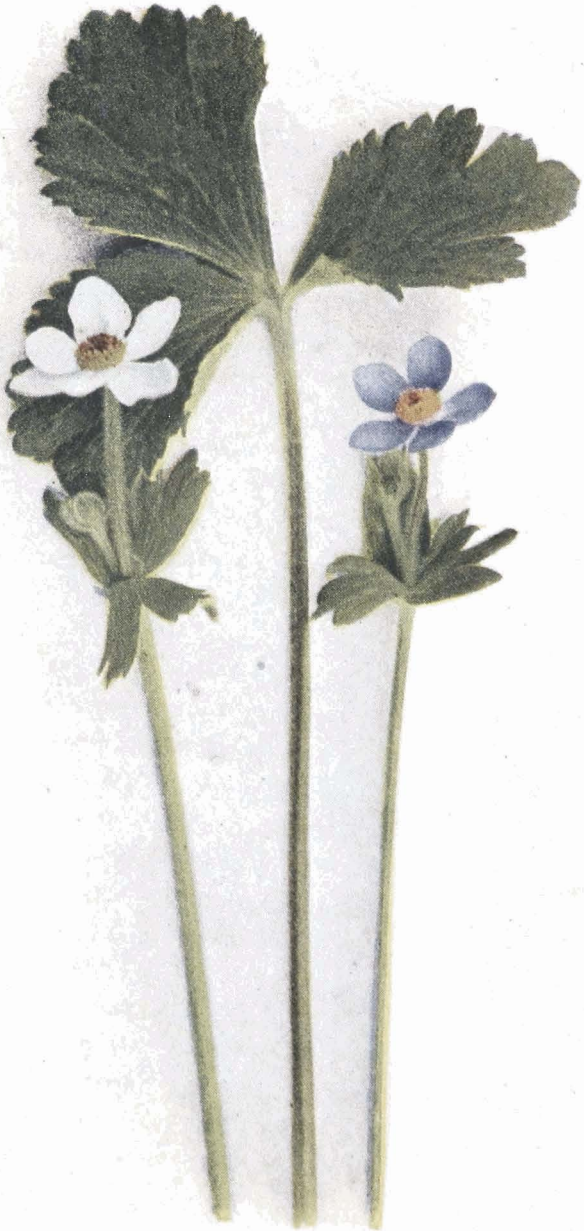
The only other Kashmir species with these characters is *A. rupestris*, which is very closely allied and probably only a more slender, smaller form. It has yellow flowers, and the segments of the leaves are shortly stalked. It only grows at high altitudes above 11,000′.

Flowering Season. April to June.

Locality. Common throughout Kashmir at elevations of 8–12,000′. Abundant at Gulmarg in open situations.

Distribution. Throughout the Temperate and Alpine Himalaya from Kashmir to Sikkim, 9–15,000′.

Uses. The root and seeds possess medicinal properties. Seeds if taken internally produce vomiting. The oil extracted from them is used in rheumatism. The plant yields a toxic substance termed Anemonin.



ANEMONE OBTUSILOBA, *Don.*

ANEMONE TETRASEPALA, *Royle.*

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is derived from the Greek word "*Anemos*," the wind, referring to the exposed situations in which some species grow. The specific name "*tetrasepala*" refers to the sepals being often only four in number.

Description. A tall, robust perennial, attaining sometimes as much as 2½′ in height, with only radical leaves, and leafless flowering stems bearing many white flowers arranged in umbels, that is to say, with the pedicels of the flowers springing from the same point like the wires of an umbrella.

Leaves, all radical, 3–10″ diam., long petioled, deeply 5-lobed, with the segments entire or again lobed or deeply serrated.

Flowering stems, 1 to 2½′ in height, bearing many flowers in umbels with large serrated involucral bracts at the base of the umbel.

Flowers, 1½–2″ diam., in simple or compound umbels.

Sepals, often only 4 (but frequently 5–7) petaloid.

Petals, 0.

Stamens, many.

Carpels, many, free, each with a single ovule.

Fruit, a cluster of achenes, shortly stalked, with a short, sharp, incurved beak. Achenes are not imbedded in wool.

Distinguishing characters. Flowers 1½–2″ diam., many on the same flowering stems and in umbels, achenes not imbedded in wool. There are two other species with these characters which are closely allied and may be distinguished as follows :—

A. tetrasepala. 1–2½′ in ht. Leaves almost hairless, up to 10″ in. diam. Segments of leaves entire, lobed

or deeply serrated. Flowers in simple or compound umbels. Achenes obovate, much flattened, with a short incurved beak.

A. narcissiflora. A smaller plant, 1′ in ht. Leaves densely clothed with long soft hairs, 1–2″ diam. Segments of leaves deeply cut into linear segments. Flowers in simple umbels only. Achenes almost round with an incurved beak.

A. polyanthes. A smaller plant than *A. tetrasepala*, 1–2′ in ht. Leaves densely silky, 2–4″ diam., with fewer, broader and more rounded teeth than *A. tetrasepala*. Flowers in simple or compound umbels. Achenes broadly oval with a short straight beak.

Flowering Season. June.

Locality. At elevations of 10–11,000′. Abundant on Killenmarg.

Distribution. Murree and Kashmir, 7–11,000′.

ANEMONE TETRASEPALA, *Royle.*

ADONIS CHRYSOCYATHUS, *Hook.*

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is the name of a beautiful Greek youth who, according to legend, was killed by a wild boar, his blood staining the neighbouring flowers, which in some species of *Adonis* are of a scarlet colour.

Description. A very handsome perennial, growing at fairly high elevations and one of the gems of Kashmir. It grows in a tufted form with numerous graceful fern-like leaves and several leafy stems, each bearing a large solitary golden yellow flower.

Stems, several, leafy, 6–9″ in length, but becoming considerably lengthened to as much as 15″ in fruit.

Radical leaves, 3–8″, petioled, much divided into narrow linear segments.

Flowers, 2″ in diam., golden yellow, buds globose.

Sepals, 7–8, petaloid, coloured.

Petals, 16–24, twice as long as the sepals, narrow.

Stamens, many.

Carpels, many.

Fruit, a cluster of achenes and about $\frac{3}{4}$″ diam.

Distinguishing characters. The large golden yellow flowers with many petals distinguishes it from other species of *Adonis*.

Flowering Season. June, July.

Locality. At elevations of 10–12,000′. Abundant on Killenmarg on open rocky ground, and extending plentifully along the Pir Panjal Range.

Distribution. Chamba and Western Tibet.

ADONIS CHRYSOCYATHUS, *Hook.*

CALTHA PALUSTRIS, var. ALBA, *Linn.*

White flowered Marsh Marigold.

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is from the Greek "*kalathos*," a cup, referring to the shape of the flowers. The specific name is from the Latin "*palustər*," marshy, referring to the marshy nature of the locality where the plant usually grows. The plant is a white flowered variety of the British species *Caltha palustris*, which has golden yellow flowers and is known as the "Marsh Marigold."

Description. A robust aquatic perennial, with glabrous glossy, kidney-shaped leaves and white flowers.

Stem, 1–2′ in height, stout, branched and leafy.

Leaves, kidney-shaped, glabrous, with usually finely toothed margins, radical leaves long petioled, 2–6″ diam.

Flowers, white, 1–2″ diam., terminal.

Sepals, usually 5 or 6, petaloid.

Petals, 0.

Stamens, many.

Carpels, many, free.

Fruit, of 5–10 follicles, many seeded.

Distinguishing characters. There is no other species. The white flowers distinguish it from the yellow flowered variety, *C. palustris*, var. *normalis*.

Flowering Season. June, July.

Locality. At elevations of 8–10,000′, in shallow streams and on marshy ground. Abundant at Gulmarg.

Distribution. Western Temperate Himalaya from Kashmir to Nepal; Europe, Asia and N. America.

Uses. The root is considered poisonous.

CALTHA PALUSTRIS, var. ALBA, *Linn.*

TROLLIUS ACAULIS, *Lindl.*

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is from the Scandinavian word "*troll*," a witch. The British species *Trollius europæus* is called the "Globe-flower," from the rounded form of the flower, but in *T. acaulis* the flowers are more open with spreading sepals.

Description. A handsome Alpine perennial with long petioled radical leaves, divided into 5 lobes and a leafy stem bearing a large solitary yellow flower.

Stem, unbranched, the base enclosed with brown fibres, 3-6" in length in flower, but becoming much elongated in fruit.

Leaves. Radical leaves, long petioled, deeply cut into 5 lobes which are again incised. **Cauline leaves,** 1-3, similar to the radical leaves, with the bases of the petioles sheathing.

Flowers, 2" diam., golden yellow, solitary, terminal.

Sepals, 5-8, coloured, petaloid, spreading.

Petals, 12-16, very small, shorter than the stamens.

Stamens, many.

Carpels, many, free.

Fruit, of several follicles of about 1" in length.

Distinguishing characters. No other species. Easily distinguished from *Adonis chrysocyathus* by the different form of leaves.

Flowering Season. June, July.

Locality. At high elevations, 11-13,000'. Plentiful on Apharwat.

Distribution. West Alpine Himalaya from Kashmir to Kumaon.

TROLLIUS ACAULIS, *Lindl.*

ACTÆA SPICATA, *Linn.*

Baneberry.

Nat. Order. *Ranunculaceæ*. The Buttercup Family.

Name. From "*Akte*," the Greek name of the "elder" (*Sambucus nigra*) referring to a resemblance between the foliage and fruit of the two plants. The English name refers to the poisonous nature of the berries.

Description. A perennial of 2–3′ in height, with large divided leaves and a terminal raceme of small white flowers.

Stem, erect, stout, 2–3′ in height.

Leaves, exstipulate, alternate, divided twice or thrice into three parts (ternately compound), leaflets with close fine sharp teeth, the terminal leaflet 3-lobed.

Flowers, white, about $\frac{1}{4}$″ diam., many in a terminal raceme.

Sepals, 4, petaloid, white, falling early.

Petals, 4, small, shorter than the sepals.

Stamens, many, longer than the sepals.

Carpel, 1, with many ovules.

Fruit, a black ellipsoid berry about $\frac{1}{2}$″ long, with about 10 seeds. The fruits are borne singly at the ends of stout, stiff, horizontally radiating pedicels.

Distinguishing characters. No other species. It is the only plant of the natural order *Ranunculaceæ* whose fruit is a berry.

Flowering Season. June.

Locality. At elevations of 7–9000′ in shady woods. Frequent in the fir forests of Gulmarg.

Distribution. Temperate Himalaya from Kashmir to Bhotan; Europe, including Great Britain, N. Asia, America.

Uses. In Canada the root is given for snake-bite, and is considered useful for treating nervous disorders and rheumatic fever.

ACTÆA SPICATA, *Linn.*

CIMICIFUGA FOETIDA, *Linn.*

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is derived from the Latin "*cimex*," a bug, and "*fugo*," to drive away. The specific name is from the Latin "*foetidus*," a bad smell. The flowers and unripe fruits of the plant have an extremely unpleasant smell and hence its name.

Description. A tall, robust perennial of 4–7′ in height, with large divided leaves and at the top of the stem a long curved raceme of small yellowish flowers.

Leaves, exstipulate, alternate, ternately divided, long petioled, the lower ones 1–2′ in length.

Flowers, about ¼″ diam., yellowish, in long curved terminal and axillary racemes, the lower portion of the raceme often branched with smaller racemes.

Sepals and Petals, small, concave, yellowish, with little distinction between them.

Stamens, many.

Carpels, 1–8, free, with many ovules.

Fruit, a cluster of 3–8 shortly pedicelled follicles of ½–1″ in length. The follicles are flattened, narrowed below, and rounded above with a short beak on one side.

Distinguishing characters. No other species.

Flowering Season. August.

Locality. At elevations of 8–10,000′ in woods. Frequent in the fir forests at Gulmarg.

Distribution. Temperate Himalaya from Kashmir to Bhotan; E. Europe and Siberia.

Uses. The root contains a resinous substance termed cimicifugin and is said to possess medicinal properties.

In America the root of a closely allied species, *C. racemosa* (the Black Snake-root) is used in the form of a tincture in cases of rheumatic fever. The fresh leaves are used as a poultice for rheumatism in the joints. In Siberia the plant is used to drive away bugs and fleas.

CIMICIFUGA FOETIDA, *Linn.*

PÆONIA EMODI, *Wall.*

The Himalayan Peony.

Nat. Order. *Ranunculaceæ.* The Buttercup Family.

Name. The generic name is from "*Pæon*," the legendary physician who cured the gods of their wounds in the Trojan war.

The local name is "Mamekh" (Punjabi) or "Mid" (Kashmiri).

Description. A stout, shrubby perennial, 1–2½′ in height, with large divided leaves and large white flowers of 3–4″ diam.

Root, a cluster of thick fleshy roots.

Leaves, exstipulate, alternate, glabrous, 6–12″ in length, petioled, divided into distinct leaflets or deeply cut into segments.

Flowers, 3–4″ diam., white, usually solitary (or sometimes 2 or 3). Flower buds globose.

Bracts, 2 or 3 leafy, lying close against the calyx.

Sepals, 5, persistent, outer ones with a leafy point.

Petals, 5–10.

Stamens, many.

Carpels, 1–5, surrounded below by a fleshy disk.

Fruit, a single follicle (rarely 2) about 1″ long.

Distinguishing characters. No other species.

Flowering Season. May, June.

Locality. At elevations of 7–10,000′, *e.g.* Nagmarg, not common near Gulmarg. Very abundant in the Liddar Valley near Pahlgam.

Distribution. Throughout the North Western Himalaya from Kashmir to Kumaon.

Uses. The tubers, flowers and seeds have medicinal properties. It was a common belief that peony roots, if worn round the neck, prevented attacks of epilepsy.

PÆONIA EMODI, *Wall.*

PODOPHYLLUM EMODI, *Wall.*

Nat. Order. *Berberideæ.* The Barberry Family.

Name. The generic name is from the Greek "*podos*," a foot, and "*phyllum*," a leaf, referring to the shape of the leaf. The local name is "Ban-kakri" (Punjabi) or "Banwangan" (Kashmiri).

Description. A perennial of 1–2′ in height, with one to three large deeply divided leaves on the upper portion of the stem. It produces a solitary white flower, which appears very early and only lasts a short time, becoming replaced by a very conspicuous large pulpy bright red fruit. Young plants have only a single leaf, but older plants have two or three leaves.

Root, a dense cluster of fleshy fibres.

Stem, 1–2′ in height, stout, erect, unbranched.

Leaves, 1 to 3, exstipulate, alternate, glabrous, long petioled, divided deeply to the middle or base into 3 to 5 lobes, which are sharply toothed and often with deep incisions. The young leaves before unfolding are brownish, plaited and folded downwards from the top of the petiole.

Flowers, 1½–2″ diam., white or delicately tinged with pink, solitary, appearing at the same time as the leaves at the top of the stem. When fully developed the flower will be found with its stalk growing from the petiole of the uppermost leaf, at about an inch from the base of the petiole.

Peduncle, short, thick and erect in flower, but becoming elongated and bent over as the fruit ripens.

Sepals, 3, petaloid.

Petals, 6.

Stamens, 6.

Carpel, 1 with a large stigma on the ovary.

Fruit, a large scarlet-red soft pulpy berry, of 1½-2½″ in length, which hangs downwards on a short recurved stalk attached to the petiole of the uppermost leaf. It is ellipsoid in shape, but narrowed at both ends, and contains many seeds embedded in the pulp.

Distinguishing characters. No other species. Readily recognised by its large pulpy red fruit.

Flowering Season. April, May.

Locality. At elevations of 7--10,000′ in shady woods. Very abundant in the fir forests at Gulmarg.

Distribution. Throughout the Himalayas from Kashmir to Sikkim.

Uses. A valuable medicinal plant. The roots yield the drug podophyllin, which is much used in medicine, especially in the form of podophyllin pills. The roots of *P. emodi* contain as a rule double the quantity of the medicinal products as the American species *P. peltatum.* The plant is easily cultivated from seed or pieces of the rootstock.

PODOPHYLLUM EMODI, *Wall.*

NYMPHÆA ALBA, *Linn.*

White Water-lily.

Nat. Order. *Nymphæaceæ.* The Water-lily Family.

Name. The generic name refers to the Greek legends in which the Water-lilies are dedicated to the nymphs who were supposed to haunt the places where water-lilies grow.

Description. A perennial aquatic plant with very beautiful white star-like flowers and smooth glossy leaves, both flowers and leaves floating on the surface of the water.

Leaves, rounded, cordate, entire, glossy, floating on the surface of the water with long, stout, flexible stems.

Flowers, white, about 2–4½″ diam., solitary, floating on the surface of the water at the end of a long, stout, flexible, leafless stem.

Sepals, 4, green and brownish outside, white on inner surface.

Petals, about 10.

Stamens, many, the outer ones being transformed successively from petals to stamens. **Anthers** without appendages.

Carpels, many, the ovaries sunk in the fleshy disk, and with it forming a many-celled ovary crowned by a large stigma with 16 rays which have cylindrical appendages.

Fruit, a spongy berry ripening under water. Seeds buried in the pulp and each covered with a fleshy aril (*i.e.* an accessory coat covering the seed).

Distinguishing characters. The absence of appendages to the anthers, and the presence of cylindrical appendages to the stigmatic rays, distinguish it from *N. stellata*. The smaller white floating flowers and floating leaves distinguish

it easily from the Lotus-lily *(Nelumbium speciosum)* with which it is often associated and whose flowers and leaves are much larger and stand up erect above the surface of the water.

Flowering Season. Throughout the summer, May to September.

Locality. Abundant in the lakes below 6000′ (*e.g.* Dal Lake near Srinagar).

Distribution. Kashmir Lakes, Europe (including Great Britain), Siberia.

Uses. The rootstock, flowers and fruit are said to have medicinal properties.

NYMPHÆA ALBA, *Linn.*

MECONOPSIS ACULEATA, *Royle.*

Blue Poppy.

Nat. Order. *Papaveraceæ.* The Poppy Family.

Name. The generic name signifies in Greek bearing a resemblance to a poppy.

Description. An Alpine perennial and one of the most beautiful of the Kashmir plants, bearing on the same stem a number of large blue poppy-like flowers.

Stem, 1–2′ in height, stout, leafy, with short scattered prickles.

Leaves, exstipulate, alternate, irregularly pinnatifid, with scattered prickles.

Flowers, 2–3″ diam., in racemes of many flowers with long slender prickly pedicels. The colour varies from greyish steel blue to a darker blue or purple blue.

Sepals, 2, falling as soon as the flower opens.

Petals, 4.

Stamens, many.

Ovary, 1-celled, style distinct.

Fruit, a prickly capsule about $\frac{3}{4}$″ in length.

Distinguishing characters. No other species. In the genus *Meconopsis* the stigmas are decurrent at the extremity of a distinct style, whereas in the genus *Papaver* the stigmas radiate on a sessile disk with no distinct style.

Flowering Season. August.

Locality. At high elevations above 11,000′, usually in open rocky situations, *e.g.* Apharwat (not common), the hills above Sonamarg and on most of the high passes and ranges.

Distribution. Kashmir to Kumaon.

Uses. The roots are said to possess narcotic properties and are considered poisonous.

MECONOPSIS ACULEATA, *Royle*.

LAVATERA KASHMIRIANA, *Camb.*

The Kashmir Tall Mallow.

Nat. Order. *Malvaceæ.* The Mallow Family.

Name. The generic name was given in honour of two Swiss physicians of the name of Lavater.

Description. A tall, handsome perennial, 5–8′ in height, bearing many large pink mallow-like flowers.

Leaves, stipulate, alternate, covered with short soft hairs, giving the leaves a velvety texture, petioled. Lower leaves with 5 rounded lobes. Upper leaves with 3 to 5 lobes, the central lobe being much longer than the side lobes.

Flowers, 2–3″ diam., bright pink with darker coloured veins, borne singly on pedicels in the axils of the leaves.

Bracteoles, 3 immediately below the calyx, with their lower portions united, sepal-like, broad and sharp pointed.

Calyx, 5-lobed to about half-way down; lobes extending beyond the bracteoles, valvate in bud.

Petals, 5, free, with 2 deep rounded lobes, twisted in bud.

Stamens, many, filaments united, the lower portion forming a tube and the upper portion branching into a large number of slender branches bearing the anthers.

Fruit, a number of small, black, dry, kidney-shaped bodies termed cocci, which are closely packed in a ring round a thick central axis which projects above them. The cocci are the ripened ovaries and each contains a single seed.

Distinguishing characters. No other species. The united bracteoles distinguish *Lavatera* from the genus *Malva*, and the plant is also readily distinguished from species of *Malva* by its height.

Flowering Season. August, September.

Locality. At elevations of 7–9000′, very abundant in the Ferozepore nala below Gulmarg.

Distribution. Not found outside of Kashmir.

LAVATERA KASHMIRIANA, *Camb.*

GERANIUM WALLICHIANUM, *Sw.*

Wallich's Crane's-bill.

Nat. Order. *Geraniaceæ.* The Crane's-bill Family.

Name. The generic name is derived from the Greek "*geranos*," a crane (a bird with a long beak), referring to the long beaked fruit.

Description. One of the commonest of the Himalayan plants, but nevertheless one of the most attractive on account of its bright flowers. It is a rather straggling much branched plant with deeply lobed leaves and large mauve, blue or purple flowers.

Stem, 1–2′ in height, much branched.

Leaves, stipulate, opposite, deeply 3 5 lobed with the lobes deeply incised, long petioled.

Stipules, a solitary large stipule on each side of the stem inserted between the bases of two opposite petioles (interpetiolar).

Flowers, $1\frac{1}{2}$–2″ diam., varying in colour from blue-purple to red-purple with darker red veins. They are borne on long peduncles, each bearing usually 2 pedicelled flowers with 4 bracts at the base of the pedicels.

Sepals, 5, long awned (*i.e.* with a long fine bristle).

Petals, 5, free.

Stamens, 10, free.

Carpels, 5, united. **Ovary,** 5-lobed and beaked, styles 5.

Fruit, a 5-lobed, long beaked capsule, dividing into 5 valves which coil up elastically from the central axis.

Distinguishing characters. The large flowers and large interpetiolar stipules distinguish it from other species.

Flowering Season. Throughout the summer, June to September.

Locality. At elevations of 7–11,000′, in open sunny situations. Common at Gulmarg and throughout Kashmir.

Distribution. Throughout the Temperate Himalaya from Kashmir to Nepal.

Uses. Used medicinally, having astringent properties.

Adaptation for dispersal of the Seeds. An interesting characteristic, which is common to other species also, is the adaptation of its fruit for the disposal of its seeds. The lower portion of the fruit is thickened with 5 lobes, each containing a single seed, and the upper portion is a long tapering beak. When fully ripe the lobes and beak split into 5 valves which coil elastically from the base upwards, hurling the seeds to some distance from the plant, the valves remaining curled up and attached to the top of a central axis.

GERANIUM WALLICHIANUM, *Sw.*

DICTAMNUS ALBUS, *Linn.*

False Dittany, Burning Bush.

Nat. Order. *Rutaceæ.* The Orange Family.

Name. The generic name is from Mt. Dicte, and is the name used by Pliny for the Dittany (*Origanum Dictamnus*). The name "Burning Bush" refers to the inflammable nature of the plant. Its upper portions are covered with small red pustular glands which exude an oily substance, and if the plant be shaken and a light immediately applied it bursts into flame.

Description. A very handsome shrubby perennial with a strong, pleasant aromatic smell, divided leaves, large pink and white or white flowers with widely spreading narrow petals and long protruding stamens.

Stem, stout and almost woody, branched, 1-3′ in height, the upper portions covered with red pustular glands.

Leaves, exstipulate, alternate, odd-pinnate, with 9-15 leaflets, which are gland-dotted.

Flowers, 1½-2½″ diam., white, striped with pink, or sometimes white or pinkish, in long terminal racemes, pedicels stout and glandular.

Calyx, 5-partite, glandular.

Petals, 5, narrow, unsymmetrically arranged, 4 of them ascending in pairs and the fifth turned downwards.

Stamens, 10, inserted at the base of a thick annular disk, as long as the petals, protruding downwards in a curved bunch, with pustular glands below the anthers.

Ovary, deeply 5-lobed, glandular, style long and bent downwards.

Fruit, a hard, almost woody capsule, 1″ in diam., deeply divided into 5 almost separate segments. The segments flattened, broad, truncate, beaked, splitting open at the top,

containing 2 or 3 seeds. A portion of the inner wall of the segments becomes separated from the outer wall, and adapted to hurl the seeds a considerable distance from the plant.

Distinguishing characters. No other species.

Flowering Season. June.

Locality. At elevations of 7–8000′. Frequent in the Ferozepore nala below Gulmarg, Gurez and throughout the valley, but not common.

Distribution. Temperate Western Himalaya from Kashmir to Kunawar (Sutlej Valley), Japan, Siberia, Dahuria and westward to France and Spain.

Uses. The bark of the root is said to possess medicinal properties; contains an essential oil.

Adaptation for dispersal of Seeds. The fruit is ingeniously adapted for the dispersal of the seeds. Inside each segment of the fruit there is a white, horny, very brittle, elastic V-shaped body with its free ends held under compression by the sides of the segment, and enfolding 2 or 3 seeds. When fully ripe and the capsule segments burst open, this V-shaped body flies out, carrying the seeds with it and hurling them to a considerable distance from the plant.

DICTAMNUS ALBUS, *Linn.*

SKIMMIA LAUREOLA, *Hook.*

Nat. Order. *Rutaceæ.* The Orange Family.

Name. The generic name is from the Japanese "*skimmi*," signifying a harmful fruit. The specific name refers to a resemblance of the leaves with the leaves of the laurel. The Kashmiri name for the plant is "Ner."

Description. A strongly aromatic sweet-scented evergreen perennial shrub, 3–5′ in height, with simple glossy leaves, clusters of small yellowish-green flowers, and fruits resembling bright scarlet berries.

Leaves, exstipulate, alternate, simple, entire, glabrous, shortly petioled, gland-dotted, with very indistinct nerves, crowded at the ends of the branches.

Flowers, about $\frac{1}{4}$–$\frac{1}{2}$″ diam., greenish-yellow, in short crowded terminal panicles.

Calyx, 5-lobed.

Petals, 5, free.

Stamens, 5.

Fruit, clusters of bright scarlet-red fleshy drupes, containing 1–3 stones.

Distinguishing characters. No other species. It is frequently mistaken for *Daphne cannabina*, but this plant has waxy white flowers, and the corolla is 4-lobed, with a long corolla tube.

Flowering Season. May, June, and frequently again in the autumn.

Locality. At elevations of 7–9000′. Abundant in the woods as an undergrowth at Gulmarg, Pahlgam, and throughout the valley.

Distribution. Throughout the Temperate Himalaya from Kashmir to Mishmi, Khasia Mts., Afghanistan.

Uses. Yields an essential oil. A poisonous alkaloid, skimmianin, has been found to be present in all parts of the Japanese species *S. japonica*, and the same alkaloid is probably present in *S. laureola*. The plant is not eaten by cattle. The plant is much valued by the Pandits who prepare incense from the dried leaves and also make garlands from the leaves for use at wedding ceremonies.

SKIMMIA LAUREOLA, *Hook.*

POTENTILLA ARGYROPHYLLA, *Wall.*

Nat. Order. *Rosaceæ.* The Rose Family.

Name. The generic name is derived from the Latin word "*potens*" (powerful), referring to the medicinal properties formerly believed to be possessed by some species.

Description. A beautiful perennial with long petioled leaves divided into 3 separate leaflets, and with large bright yellow or red flowers.

Stem, erect or straggling, much branched, very hairy, $1\frac{1}{2}$–2′ in height, but sometimes longer.

Leaves, stipulate, alternate, long-petioled, divided digitately into 3 leaflets. **Leaflets,** 2–3″ in length, white on under surface. **Stipules,** adnate to the petiole.

Flowers, $\frac{3}{4}$–$1\frac{1}{2}$″ diam., bright yellow, orange or red, sometimes a very dark blood red or a dark reddish brown; several pedicelled flowers on a long peduncle.

Calyx, 5-lobed, persistent; attached to the outside of the calyx are 5 sepal-like bracteoles with their lobes alternate with the calyx lobes.

Petals, 5.

Stamens, many.

Carpels, many.

Fruit, a cluster of numerous achenes with long styles.

Distinguishing characters. The following characters distinguish it from other species: leaves digitately divided into 3 leaflets, leaflets above 2″ in length with the lower surface white, many stamens, flowers exceeding $\frac{3}{4}$″ diam., achenes not concealed by long hairs of the receptacle.

Flowering Season. July, August.

Locality. At elevations of 8--12,000′ in open sunny situations, abundant at Gulmarg and on Apharwat and throughout the valley.

Distribution. Western and Central Himalaya from Kashmir to Nepal.

POTENTILLA ARGYROPHYLLA, *Wall.*

SAXIFRAGA FLAGELLARIS, *Willd.*

Nat. Order. *Saxifragaceæ.* The Saxifrage Family.

Name. The generic name is derived from the Latin "*saxum*," a stone, and "*frango*," to break, and the specific name from the Latin "*flagellum*," a whip, referring to the fine whip-like runners.

Description. A beautiful little Alpine plant with bright yellow flowers and fine red thread-like runners.

Stem, 2–8″ in height, leafy, pubescent, with long leafless red thread-like runners spreading horizontally from the base, which terminate in a bud which becomes rooted and develops into a plant.

Leaves, exstipulate, alternate, entire, linear-lanceolate, pubescent.

Flowers, about $\frac{3}{5}$″ diam., golden yellow, sometimes with red lines near the base of the petals, in corymbs of 1–10 flowers.

Calyx, 5-fid, pubescent, adnate to ovary at the base, persistent and erect in fruit.

Petals, 5.

Stamens, 10.

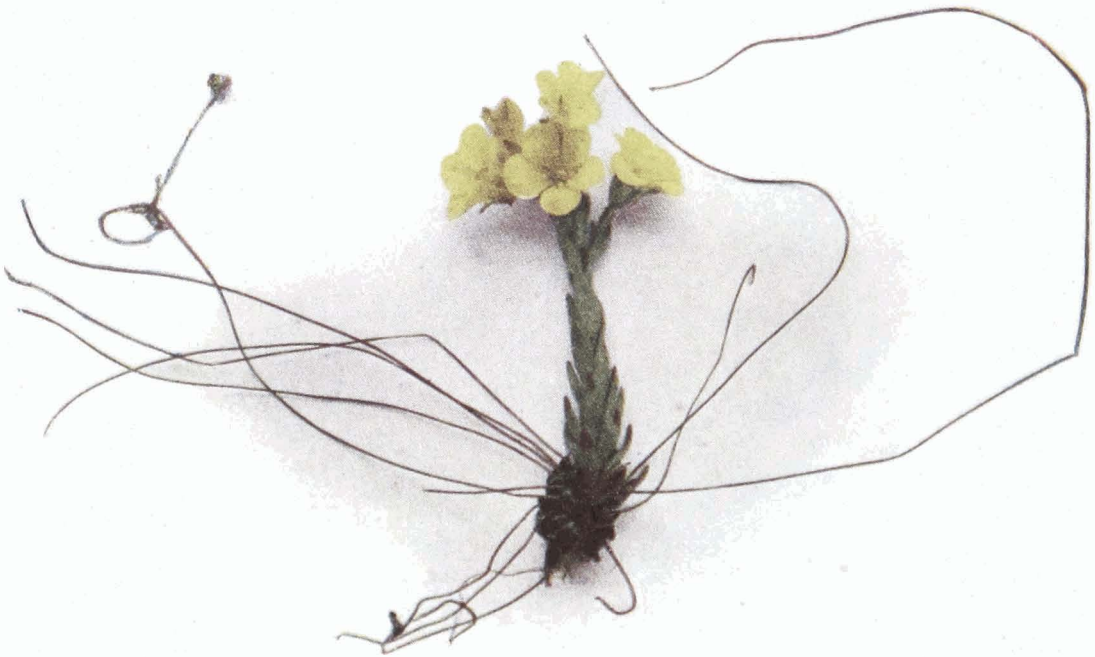
Carpels, 2, united below.

Distinguishing characters. The yellow flowers and fine red thread-like runners which terminate in a rooting bud distinguish it from other species, except *S. Brunoniana*, which is closely allied but has shining glabrous leaves.

Flowering Season. July, August.

Locality. At elevations above 12,000′, *e.g.* Apharwat, Shisha Nag.

Distribution. Alpine Himalaya from Kashmir to Sikkim; N. Asia, Arctic regions and Rocky Mts.



SAXIFRAGA FLAGELLARIS, *Willd.*

SAXIFRAGA LIGULATA, *Wall.*

Nat. Order. *Saxifragaceæ.* The Saxifrage Family.

Name. The generic name is derived from the Latin "*saxum*," a stone, and "*frango*," to break.

Description. A perennial with large shining rounded leaves and pinkish flowers, usually seen growing in masses on overhanging rocks.

Rootstock, stout and woody.

Leaves, 4–10″ diam., round, cordate at the base, undivided, entire with the margins fringed with hairs, the base of the petioles with a large sheath.

Flowering stems, leafless, thick, usually reddish, flexible, 4–12″ in length.

Flowers, 1–1½″ diam., white or pale rose-pink, many, corymbose or in one-sided panicles.

Calyx, 5-fid, base adnate to the ovary, lobes erect in fruit.

Petals, 5, rounded, clawed.

Stamens, 10.

Carpels, usually 2, united below (sometimes 3) with very long styles.

Fruit, a round capsule.

Distinguishing characters. Stout rootstock, large entire leaves with large sheath at base of petioles, flowers white or pink on a leafless scape, calyx lobes erect in fruit. The only other species with these characters is *S. Stracheyi*, which may be distinguished as follows:—

S. ligulata. Base of leaves cordate, pedicels and calyx pubescent, fruit subglobose.

S. Stracheyi. Base of leaves scarcely cordate, pedicels and calyx glabrous, fruit ovate-lanceolate.

Flowering Season. March to May.

Locality. At elevations of 7–10,000′, usually growing in masses on rocks, Gulmarg and throughout the valley.

Distribution. Temperate Himalaya from Kashmir to Bhotan; Khasia Mts.

Uses. The root possesses medicinal properties and is used as a tonic and for other purposes.

SAXIFRAGA LIGULATA, *Wall.*

SEDUM EWERSII, *Ledeb.*

Nat. Order. *Crassulaceæ.* The Stonecrop Family.

Name. The generic name is derived from the Latin word "*sedeo*," to sit, referring to the manner in which the radical leaves in some species are arranged in a rosette close to the ground. The British species are known by the name of Stonecrop, from their habit of growing on walls and rocks.

Description. A perennial which grows on rocks, with broad, thick, succulent leaves and small rose-pink star-like flowers.

Rootstock, it has no thick rootstock, as in some species.

Stem, 4-12″ in height, erect with the lower portion sometimes trailing.

Leaves, opposite (or sometimes some of the uppermost ones alternate), sessile, rounded, thick and succulent, entire or with the margin slightly wavy, pale coloured, few or no radical leaves.

Flowers, ¼-⅓″ diam., rose-pink or rose-purple, in many flowered corymbose cymes.

Calyx, 5-partite.

Petals, 5, free, spreading horizontally, giving the corolla a star-like appearance.

Stamens, 10, filaments rose-purple and the anthers almost black.

Carpels, 5, free or slightly united at the base.

Fruit, a cluster of 5 erect follicles.

Distinguishing characters. The 10 stamens, 5 free petals and 5 almost free carpels distinguish it from other genera of the order *Crassulaceæ*; and from other species of *Sedum* it is easily distinguished by its rose-pink flowers and broad, rounded, opposite, sessile and entire leaves.

Flowering Season. August, September.

Locality. At elevations of 8–12,000′, on rocks, *e.g.* Apharwat, Sonamarg.

Distribution. Temperate and Alpine Himalaya from Kashmir to Kumaon, Alpine Siberia and Soongaria.

SEDUM EWERSII, *Ledeb.*

MORINA LONGIFOLIA, *Wall.*

Nat. Order. *Dipsaceæ.* The Scabious Family.

Name. The generic name was given in honour of a French Botanist of the seventeenth century of the name of Morin.

Description. A tall perennial of 2–4′ in height, with long narrow prickly leaves and white and pink flowers which have a long slender corolla tube protruding far beyond the calyx.

Stem, 2–4′, stout, erect.

Leaves, opposite or in whorls of usually 3, sessile, long and narrow, very prickly, with long spiny teeth.

Flowers, 1–1½″ in length, variegated rose-pink and white, in distant whorls in the axils of the leaves forming a long interrupted spike, leafy spiny bracts interspersed amongst the flowers, and the bases of the flowers enclosed in a small cup-like involucel (formed from united bracteoles).

Calyx, the limb unequally 2-lipped, and the lips 2-fid with rounded lobes.

Corolla, with a long slender protruding tube about 1″ in length, surmounted with an oblique 2-lipped and 5-lobed limb.

Stamens, 2 fertile stamens inserted at the mouth of the corolla tube, filaments shorter than the corolla lobes.

Fruit, an achene free in the involucel.

Distinguishing characters. There are two other species, namely, *M. persica* and *M. coulteriana*. In the former the filaments are longer than the corolla lobes, and the latter has yellow flowers.

Flowering Season. August, September.

Locality. At elevations of 8–10,000′, in open sunny situations, *e.g.* Gulmarg, Sonamarg.

Distribution. Temperate and Alpine Himalaya from Kashmir to Bhotan.

Fertilisation. According to Kerner the flowers are adapted either for cross-fertilisation by means of moths with long probosces such as the *Sphingidae* (Hawk-moths) or *Noctuae*, which visit the flowers at night to suck the honey juices from the long slender corolla tube, or for self-fertilisation. The flowers first open at dusk, and if visited at once by one of these moths, which appear on the wing shortly after the flowers open, cross-fertilisation may be effected by transference of pollen from one flower to another. If, however, a flower is not visited at once by one of these moths, the very next morning after the flower has opened the top of the pistil curves over, so that the stigma is brought into close contact with the anthers and self-fertilisation takes place.

MORINA LONGIFOLIA, *Wall.*

SCABIOSA SPECIOSA, *Royle.*

The large flowered Himalayan Scabious.

Nat. Order. *Dipsaceæ.* The Scabious Family.

Name. The generic name is derived from the Latin "*scabies*," a skin disease, for which some species were considered to be a remedy. The specific name is from the Latin "*speciosus*," showy or handsome, referring to the flower.

Description. A very handsome perennial, growing in tufts with mauve coloured flowers in large heads, as in the natural order *Compositæ*.

Stems, tufted, leafy and branching, 1–2′ in height.

Leaves, exstipulate, opposite, the base usually pinnatifid with small lobes.

Flowers, in large, flat, terminal heads of 2-3″ diam., bright or pale mauve, heads radiate, *i.e.* the outer flowers (flowers of the ray) different from the inner ones (flowers of the disk). The base of each flower enclosed in a small ribbed cup-like involucel (formed of united bracteoles).

Calyx, the tube adnate to the ovary, the limb of 5 long bristles.

Corolla, 5-fid.

Stamens, perfect ones 4, inserted on the corolla tube.

Ovary, inferior, 1-celled.

Fruit, an achene $\frac{1}{4}$″ or rather more in length, crowned by the persistent limb of the involucel and the 5 bristles of the calyx.

Distinguishing characters. The calyx limb consisting of bristles distinguishes the genus *Scabiosa* from the genus *Dipsacus*, in which the calyx is blunt without bristles. The large heads and leaves usually pinnatifid at the base, distinguish *S. speciosa* from other species of *Scabiosa*.

The small involucel outside the calyx and enclosing the base of the flower distinguishes the natural order *Dipsaceæ* from the natural order *Compositæ*.

Flowering Season. July, August.

Locality. At elevations of 8–11,000', *e.g.* Sonamarg, Apharwat.

Distribution. Temperate Himalaya from Kashmir to Kumaon.

SCABIOSA SPECIOSA, *Royle.*

ASTER DIPLOSTEPHIOIDES, *Benth.*

Nat. Order. *Compositæ.* The Composite Family.

Name. The generic name is from the Greek "*aster*," a star.

Description. A very beautiful plant growing to a height of about 1–1½′ and bearing at the top of a simple unbranched leafy stem a large solitary flower head of a rich blue-purple colour with a bright orange centre.

Stem, 1–1½′ in height, erect, leafy, unbranched.

Leaves, exstipulate, alternate, simple, sessile, entire, 2–3″ in length, erect.

Flowers, in a solitary terminal radiate head, 3″ diam., outer flowers (flowers of the ray) with long, very narrow ligules, bright blue-purple. The central flowers (flowers of the disk) tubular, bright orange.

Involucral bracts in few series, sometimes 1″ in length.

Calyx of reddish pappus.

Fruit, an achene about ⅛″ long, crowned with reddish pappus.

Distinguishing characters. The simple unbranched stem with erect sessile leaves and the large size of the head of flowers distinguish it from other species.

Flowering Season. July, August.

Locality. At elevations of 9–12,000′, frequent on Apharwat.

Distribution. Alpine Himalaya from Kashmir to Sikkim.

ASTER DIPLOSTEPHIOIDES, *Benth.*

CREMANTHODIUM DECAISNEI, *Clarke.*

Nat. Order. *Compositæ.* The Composite Family.

Name. The generic name is from "*kremao,*" I suspend, and "*anthos*" a flower, referring to the nodding character of the flower head.

Description. An extremely handsome Alpine perennial, with a few radical leaves, a single flowering stem bearing 1 or 2 small kidney-shaped leaves and a solitary terminal flower head which is bent over, the outer flowers of a bright canary yellow colour and the central flowers brown.

Flowering stem, 6–10″ in height.

Radical leaves, petiole 1–4″ in length, blade 1–2″ diam., kidney-shaped, with small rounded teeth surmounted with a short fine point (apiculate), upper surface more or less glabrous and the lower surface hairy. **Stem leaves,** similar but smaller, the petiole thickened above, and inflated with a sheaf clasping the stem below.

Flowers in a terminal, solitary, nodding, radiate head of 1½–2½″ diam. The outer flowers (flowers of the ray) with ligules ¾–1″ in length by about ¼″ wide with 3 short teeth, bright canary yellow. The central flowers (flowers of the disk) tubular and dark brown.

Involucral bracts arranged in a single row, not overlapping, about ¼–⅜″ in length, of a rich red-brown colour.

Fruit, a narrow achene crowned with white pappus.

Distinguishing characters. There is no other Kashmir species.

Flowering Season. August.

Locality. At elevations of above 11,000′, frequent on Apharwat.

Distribution. Alpine Himalaya from Kashmir to Sikkim.

CREMANTHODIUM DECAISNEI, *Clarke.*

SAUSSUREA LAPPA, *Clarke.*

The Kuth Plant.

Nat. Order. *Compositæ.* The Composite Family.

Name. The generic name was given in honour of a celebrated botanist of the name of De Saussure. The local name in Kashmir is "*Kuth.*" The Sanskrit name is "*Kushta*" or "*Kashmirja,*" the latter name indicating Kashmir as the locality from whence the root of the plant was exported. In Calcutta the root is known as "*pachak.*" It is supposed to be the *costus* of the ancients, and the root is often referred to under the name of "costus root." One of its synonyms is "*Aucklandia ccstus.*"

Description. A tall, robust perennial with very large radical leaves and a stout flowering stem bearing at its summit a cluster of several rounded sessile flower heads of a very dark blue-purple or almost black colour.

Root, stout, with a strong penetrating but not unpleasant smell.

Stem, stout, erect, 4–6′ in height, unbranched with few leaves.

Leaves, radical leaves very large, 2–4′ in length, triangular or hastate, with a long lobately winged petiole. Cauline leaves similar but smaller, alternate, usually sessile, with an auricled base more or less clasping the stem.

Flowers, in sessile, hard, rounded heads of 1–1½″ diam. The heads in axillary and terminal clusters of 2–5 heads. The flowers all similar and tubular, very dark blue-purple or almost black.

Interspersed and buried amongst the flowers are long stiff bristles growing from the receptacle.

Involucral bracts, in many overlapping series, hard, with their tips sharp and recurved.

Corolla, $\frac{3}{4}$″ long, tubular.

Stamens, free, the anther bases sagittate with long hair-like tails.

Fruit, an achene about $\frac{1}{3}$″ long with brown pappus hairs $\frac{2}{3}$″ long.

Distinguishing characters. The plant is easily distinguished by the very large radical leaves with long lobately winged petioles and the clusters of hard, round, sessile, almost black heads of flowers.

Flowering Season. August, September. Seed ripens in September.

Locality. At elevations of 9–12,000′. It occurs sporadically in the Kashmir State throughout the Jhelum and Chenab Valleys and in the Zanskar Tract of the Indus Valley, usually in shady moist situations, *e.g.* Gulmarg, Sonamarg. It also occurs gregariously over large areas in the Kishenganga Valley and in Kishtwar of the Chenab Valley, often forming an undergrowth in the birch forests.

Distribution. It does not grow indigenously outside of the Jhelum and Chenab Valleys, except as far as is known at present in the Zanskar Tract of the Indus Valley, and only occurs gregariously within the Kashmir State. It may occur sporadically in Pangi of the Chamba State, which adjoins Kishtwar and is within the Chenab Valley, and possibly also in Kaghan of Hazara, which adjoins the Kishenganga Valley and is included within the Jhelum Valley. If it occurred extensively at any previous time in Pangi or Kaghan,

which is doubtful, these sources of supply of the root have long ago been exhausted, and all the Kuth root which finds its way to the market at the present day comes from Kashmir, much being smuggled via Chamba, Hazara and Kulu.

Uses. It is a valuable economic plant, the useful portion being the root. On being dug up, the roots are cut into short lengths of about 3 inches, dried and exported in this form to China, where the product is used as incense in religious ceremonies or for medicinal purposes. The smaller and irregular pieces are ground to powder and made into incense sticks with some binding material. The longer clean pieces are cut into very thin slices, which are used for burning in lamps at shrines, or are used for the preparation of a decoction for medicinal purposes, or are used in hot baths for imparting invigorating effects. In ancient Sanskrit books Kuth is referred to as a cure for almost all diseases, and there seems to be little doubt that formerly Kuth root was extensively used in India and other countries, but at the present day the quantity of Kuth root used outside of China and Japan is insignificant. The root yields an oil which is said to be very beneficial for the treatment of rheumatism.

Stewart, in his book on Punjab plants, published in 1868, states that in the year 1837-38 A.D. nearly 7000 maunds of Kuth root were exported from Calcutta to China, and the exports at the present day are much the same. The export of Kuth root from Kashmir is a State monopoly, and a special Kuth Regulation prohibits any person from exporting any portion of the Kuth plant from Kashmir territory.

SAUSSUREA LAPPA, *Clarke.*

CODONOPSIS OVATA, *Benth.*

Nat. Order. *Campanulaceæ.* The Bell-flower Family.

Name. The generic name is derived from the Greek "*kodon*," a bell, and "*opsis*," form, referring to the bell-like form of the flower. The name of the natural order is from the genus *Campanula*, which is the Latin word for a bell.

Description. A slender graceful perennial with very beautiful bell-shaped flowers of a delicate pale grey blue-purple with darker veins.

Stem, 6–12″, trailing and then erect.

Leaves, exstipulate, alternate and opposite, ovate, shortly petioled, about ½–¾″ long by ¼–½″ wide.

Flowers, bell-shaped, about 1–1¼″ in. long, solitary, on long axillary or terminal peduncles which are often curved above, delicate pale grey blue-purple with darker purple veins.

Calyx, superior, 5-lobed, persistent, lobes becoming much elongated in fruit.

Corolla, superior, campanulate, 5-lobed with the lobes valvate in bud, narrowed or rounded at the base.

Stamens, 5, free, alternate with corolla lobes, inserted on the margin of a disk, above and surrounding the ovary.

Ovary, 3-celled, with a short conical crown, stigma of 3 large ovate lobes.

Fruit, a capsule, depressed, with the top conical and beaked and protruding from the persistent calyx, which has 5 much elongated spreading lobes.

Distinguishing characters. The only other species is *C. rotundifolia*, which is a slender climber with a long twining stem, much larger leaves, and flowers of a greenish and brownish red colour.

Flowering Season. July, August.

Locality. At elevations of 8–12,000′, usually in open situations, *e.g.* Apharwat, Sonamarg, Gurez.

Distribution. Western Himalaya from Kashmir to Garhwal.

Uses. The roots and leaves are said to be used in the form of poultices for the treatment of ulcers and wounds.

CODONOPSIS OVATA, *Benth.*

RHODODENDRON CAMPANULATUM

(Don).

Nat. Order. *Ericaceæ.* The Heath Family.

Name. The generic name is derived from the Greek words "*rhodon*," a rose, and "*dendron*," a tree.

Description. A large evergreen perennial shrub, with simple leaves which are cinnamon coloured on the under surface, and bearing at the top of the branches dense clusters of large handsome campanulate flowers of a pale lilac or mauve colour, or sometimes almost white.

Stem, stout, woody, much branched, 6–12′ in height.

Leaves, exstipulate, alternate, simple, entire, elliptic, crowded towards the ends of the branches, cinnamon coloured on the lower surface, 3–5″ in length.

Flowers, about 1½″ in length, in terminal dense fascicles of pedicelled flowers which are almost white or delicately tinged with lilac or mauve, pedicels stout about 1″ in length.

Calyx, 5-lobed, with very small triangular lobes.

Corolla, campanulate, 5-lobed, about 1½″ in length by 1″ diam.

Stamens, 10.

Ovary, 5–9 celled, with a long style.

Fruit, a cylindrical woody capsule, about 1″ in length.

Distinguishing characters. The large pale coloured flowers and the cinnamon colour of the under surface of the leaves distinguish it from other species. *Rhododendron arboreum* is a tree with a thick trunk, and the flowers are usually bright rose red, and the leaves white on the under surface.

Flowering Season. June, July.

Locality. At elevations of 10--12,000′. Plentiful on the lower slopes of Apharwat.

Distribution. Alpine Himalaya from Kashmir to Bhotan.

Uses. The leaves and twigs are said to possess medicinal properties. The leaves are not eaten by goats and are considered poisonous to them.

RHODODENDRON CAMPANULATUM, *Don.*

PRIMULA DENTICULATA, *Sm.*

Nat. Order. *Primulaceæ.* The Primrose Family.

Name. The generic name is from the Latin "*primus*," first, referring to the early flowering of some species.

Description. The commonest of the Primulas and one of the earliest flowers to bloom at elevations above 7000′. It is a perennial with a stout rootstock, radical leaves, and a leafless flowering stem, at the top of which the mauve or blue flowers, which are pedicelled, are arranged in a neat compact globular cluster.

Leaves, all radical, simple, ob-ovate, spathulate, sessile, or the base narrowed into a short winged petiole. The lower surface sparingly covered with a yellowish powder. At the time of flowering the leaves are small, but subsequently become much elongated and in favourable situations they may attain 1′ in length.

Flowers, $\frac{1}{2}$–$\frac{3}{4}$″ in diam., blue, mauve or lilac, in compact rounded clusters of shortly pedicelled flowers, the clusters about $1\frac{1}{2}$–$2\frac{1}{2}$″ in diam.

Calyx, 5-lobed.

Corolla, salver-shaped, the tube usually twice as long as the calyx, 5-lobed and each lobe notched.

Stamens, 5, inserted on the corolla tube, opposite the lobes.

Ovary, 1-celled with many ovules.

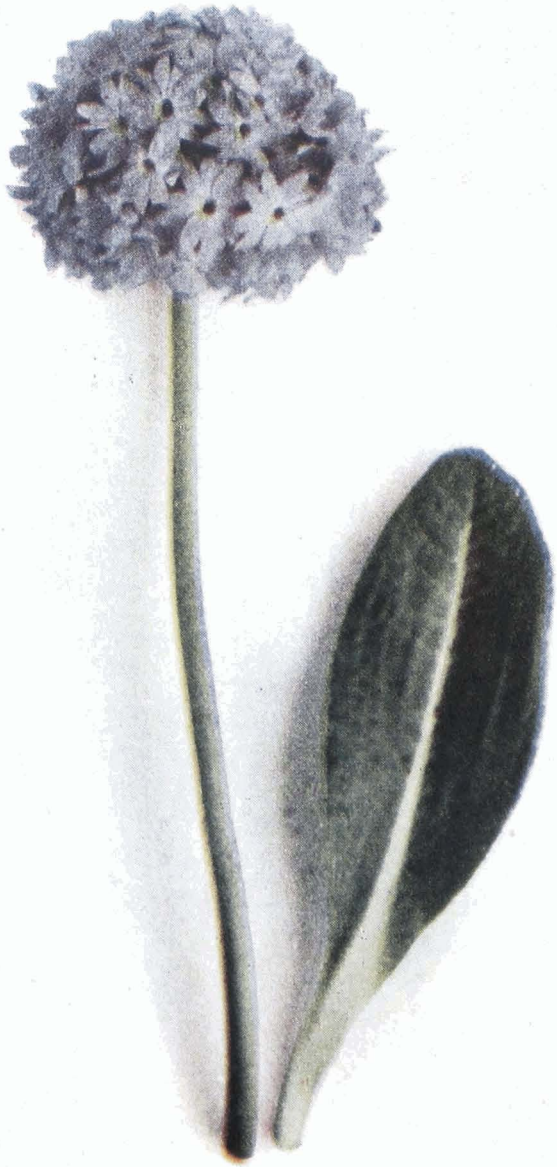
Fruit, a capsule usually oblong.

Distinguishing characters. The leaves narrowed into a short winged petiole, the colour of the flowers and their arrangement in a compact round cluster distinguish it from other species.

Flowering Season. March to June.

Locality. At elevations of 7–12,000′. Abundant at Gulmarg. Its appearance in profusion in the recently formed willow plantation at Haran near and at the same elevation as Srinagar is interesting, the seed evidently having been deposited there by the flood waters of the Sindh river.

Distribution. Temperate Himalaya from Kashmir to Bhotan, Khasia Mts., Afghanistan.



PRIMULA DENTICULATA, *Sm.*

PRIMULA ROSEA, *Royle.*

Nat. Order. *Primulaceæ.* The Primrose Family.

Name. The generic name is from the Latin "*primus*," first, referring to the early flowering of some species. The specific name refers to the colour of the flowers.

Description. A beautiful Primula with simple radical leaves and bright rose-red flowers with a yellow centre.

Stem, no stem except the leafless flowering stem.

Leaves, all radical, simple, elliptic or ob-ovate, spathulate, with the base narrowed into a winged petiole, green and glabrous on both surfaces, margin with short closely set teeth, midrib broad and lateral, nerves very inconspicuous, up to about 6″ in length.

Flowers, $\frac{5}{8}$–1″ in diam., bright or pale rose-red with a yellow centre, in lax umbels of 3 to 10 pedicelled flowers on a scape of 3–9″ in length. In dwarfed specimens the flower is often solitary on a short scape of about 1″ in length.

Bracts, with the base rather swollen and produced downwards.

Calyx, 5-lobed to the middle.

Corolla, salver-shaped, 5-lobed, with the lobes 2-fid, the corolla tube $1\frac{1}{2}$ times the length of the calyx.

Stamens, 5, inserted on the corolla tube, opposite lobes of corolla.

Fruit, a capsule, globose sunk in the calyx.

Distinguishing characters. The bright rose-red flowers easily distinguish it from other species.

Flowering Season. May, June, and in the autumn September.

Locality. 8–12,000′. Abundant at Gulmarg in moist open situations.

Distribution. Western Himalayas from Kashmir to Kulu; Afghanistan.

PRIMULA ROSEA, *Royle*.

PRIMULA STUARTII, *Wall.*

Nat. Order. *Primulaceæ.* The Primrose Family.

Name. From the Latin "*primus*," first, referring to the early flowering of some species.

Description. A robust perennial Alpine Primula, forming large tufts, with simple radical leaves and purple or lilac flowers in loose umbels.

Stem, no stem except the leafless flowering stem.

Leaves, all radical, from a stout rootstock, narrowly oblanceolate spathulate, base narrowed into a winged petiole, entire, acute, under surface white, small at time of flowering but becoming elongated to 6–10″.

Flowers, 1–1¼″ diam., mauve, lilac or blue-purple, with a white centre, in lax umbels of few or many flowers, with rather long, slender, drooping pedicels.

Flowering stem (scape), stout, 6–10″ in length.

Bracts, erect, lanceolate, acute, not swollen and produced at the base, dark red brown.

Calyx, 5-lobed, lobes acute, red-brown in colour.

Corolla, salver-shaped, 5-lobed, lobes rounded.

Stamens, 5, inserted on the corolla tube, opposite the lobes.

Ovary, rounded and usually thickened at the top.

Fruit, an oblong capsule with many seeds.

Distinguishing characters. The leaves narrowed below to a winged petiole, flowers in lax umbels of long pedicelled flowers and bracts not produced downwards at the base distinguish it from other species.

Flowering Season. June.

Locality. At elevations of 10–12,000′. Abundant on Killenmarg on open rocky ground.

Distribution. Sub-Alpine and Alpine Himalaya and Thibet; Afghanistan.

PRIMULA STUARTII, *Wall.*

PRIMULA REPTANS, *Hook.*

The Kashmir Creeping Primula.

Nat. Order. *Primulaceæ.* The Primrose Family.

Name. From the Latin "*primus*," first, referring to the early flowering of some species, and "*reptans*," creeping, referring to the creeping stem.

Description. A beautiful Alpine Primula with minute leaves forming dense moss-like patches interspersed with large solitary blue-purple flowers.

Stem, slender, creeping.

Leaves, very minute, the upper portion rounded, $\frac{1}{8}$" diam., deeply cut into little linear lobes with recurved margins, and becoming suddenly contracted into the short slender petiole which is about $\frac{1}{8}$" in length.

Flowers, $\frac{1}{2}$–$\frac{3}{4}$" diam., bright blue-purple with a white centre, shortly pedicelled, erect, solitary.

Calyx, cleft to the middle, the lower portion smooth and round.

Corolla, salver-shaped, 5-lobed, the lobes spreading and deeply 2-fid, tube about $\frac{1}{3}$" in length.

Ovary, globose with acute tip, stigma globose.

Fruit, a capsule with many seeds.

Distinguishing characters. The minute leaves distinguish it from other species except *P. minutissima*, from which it may be distinguished by the solitary pedicelled flowers and the leaves with recurved margins.

Flowering Season. July.

Locality. At elevations of 13–14,500'. Frequent on Apharwat.

Distribution. Not outside of Kashmir.

PRIMULA REPTANS, *Hook.*

GENTIANA CARINATA, *Griseb.*

Nat. Order. *Gentianaceæ.* The Gentian Family.

Name. From Gentius, King of Illyria, who is supposed to have discovered the medicinal value of Gentian root.

Description. A small annual of 1–6″ height, with opposite leaves and clustered flowers of a rich dark blue colour.

Stem, erect, 1–6″, branched, stout.

Leaves, opposite, sessile, oblong-lanceolate, about 1–1½″ in length.

Flowers, ½″ diam., rich dark blue, in dense lateral and terminal clusters.

Calyx, 5-lobed, with lobes shorter than the calyx tube.

Corolla, 5-lobed, the lobes spreading horizontally or slightly downwards, with bi-fid folds between them as long as the lobes, mouth of corolla tube frinbriate (*i.e.* with a fringe), corolla tube about ½″ long.

Stamens, 5, attached to corolla tube and entirely included.

Ovary, 1-celled.

Fruit, a small ellipsoid capsule.

Distinguishing characters. Flowers less than 1″ in length, bi-fid fold between the corolla lobes, mouth of corolla tube frinbriate, corolla lobes spreading, leaves 1″ or more in length.

Flowering Season. June, July.

Locality. At elevations of 8–12,000′. Frequent at Gulmarg on open grass lands.

Distribution. North-West Himalaya.

GENTIANA CARINATA, *Griseb.*

SWERTIA PETIOLATA, *Royle.*

Nat. Order. *Gentianaceæ.* The Gentian Family.

Name. The generic name was given in honour of a Dutch Botanist of the seventeenth century named Emanuel Swert.

Description. A tall robust perennial, with tufts of long petioled radical leaves, a tall flowering stem with connate leaves and bearing star-like whitish flowers with blue-green veins.

Stem, 1–4′ in height.

Leaves, radical leaves, long petioled in tufts, from a stout rootstock; cauline leaves, opposite, connate.

Flowers, 1–1¼″ diam., greyish white with blue-green veins, in clusters of 3–5 pedicelled flowers borne on long peduncles erect from the axils of the leaves, forming a long narrow panicle.

Sepals, 5.

Corolla, 5-lobed, rotate, with 2 orbicular frinbriate yellow glands at the base of each lobe.

Stamens, 5, attached near the base of the corolla.

Ovary, 1-celled.

Fruit, an ovoid capsule with many seeds.

Distinguishing characters. The tufted long petioled radical leaves, 5-nerved cauline leaves, and flowers with blue-green veins and 2 orbicular frinbriate glands at the base of the corolla lobes distinguish it from other species.

Flowering Season. September.

Locality. At elevations of 8–12,000′. Very abundant at Gulmarg in the dry beds of streams.

Distribution. Western Himalaya, Kashmir, Cabul.

SWERTIA PETIOLATA, *Royle.*

POLEMONIUM CÆRULEUM, *Linn.*

Jacob's Ladder.

Nat. Order. *Polemoniaceæ.* The Jacob's Ladder Family.

Name. The generic name is the Greek name of the plant. The specific name is from the Latin "*caeruleus*," blue like the sky. With its sky-blue flowers and long ladder-like leaves the plant is appropriately named "Jacob's ladder."

Description. A tall, erect, robust perennial with odd-pinnate leaves and beautiful sky-blue flowers clustered at the top of the stem.

Stem, 1–4′ in height.

Leaves, exstipulate, alternate, odd-pinnate, with about 13–25 rather narrow leaflets.

Flowers, 1″ in diam., sky-blue, in terminal clusters of many pedicelled flowers.

Calyx, 5-lobed, persistent.

Corolla, 5-lobed, broadly funnel-shaped with spreading lobes.

Stamens, 5, attached near base of corolla, alternate with corolla lobes.

Ovary, superior, 3-celled, style shortly 3-fid.

Fruit, a small ovoid capsule, overtopped by the persistent calyx. The outer coat of the seeds when wetted breaks up elastically into spiral threads.

Distinguishing characters. There is no other species. It differs from a Campanula, for which it is sometimes mistaken, by the ovary being superior and stamens inserted on the corolla.

Flowering Season. June, July.

Locality. At elevations of 8–10,000′. Very abundant at Gulmarg, rapidly extending into clearings in the fir forests.

Distribution. Alpine Western Himalaya from Kashmir to Kumaon; Europe (rare in Great Britain), North and Central Asia, North America.

POLEMONIUM CÆRULEUM, *Linn.*

MERTENSIA TIBETICA, *Clarke.*

Nat. Order. *Boragineæ.* The Borage Family.

Name. The generic name was given in honour of a German Botanist of the name of Mertens.

Description. A beautiful small Alpine perennial, with brilliantly blue flowers, with a very long corolla tube and small radical petioled leaves.

Leaves, all sub-radical, small, elliptic, $\frac{2}{3}''$ long, entire, mucronate, with long hairs, petiole about 1" long.

Flowers, $\frac{3}{8}''$ diam., very intense dark blue, in a simple terminal, rather one-sided raceme of about 4–12 flowers borne on a peduncle of 2–4", much exceeding the leaves, without bracts.

Sepals, erect, margins with long hairs.

Corolla, salver-shaped, with a long cylindrical tube $\frac{1}{2}''$ long (4 to 5 times the length of the calyx). Limb flat, 5-lobed, lobes $\frac{1}{8}''$, sub-quadrate with tip rounded and entire. Scales in mouth of corolla tube less than half-length of corolla lobes, yellow.

Stamens, 5, attached near base of the corolla. The anthers entirely below the scales.

Ovary, 4-lobed, style long, thread-like, often extending $\frac{1}{4}''$ beyond the mouth of the corolla.

Fruit, of 4 nutlets, erect on a flat receptacle.

Distinguishing characters. The erect nutlets on a flat receptacle, racemes without bracts, anthers included, very long corolla tube, small radical leaves with long petioles, peduncles and racemes 1" or more in length, distinguish it from other species.

Flowering Season. July.

Locality. At elevations of 12–14,000'. Frequent on Apharwat.

Distribution. Western Tibet, Karakorum.

MERTENSIA TIBETICA, *Clarke.*

MACROTOMIA BENTHAMI, *DC.*

Nat. Order. *Borragineæ.* The Borage Family.

Name. The generic name is derived from the Greek "*macro*," large, and "*tomos*," a section, referring to the very long segments of the calyx. The local name in Kashmir is "Kahzaban" or "Gaozaban."

Description. A remarkable looking plant with a thick stem, long narrow leaves, and all parts covered with very long hairs, giving the plant a grey appearance. The flowers are borne at the top of the stem in a spike consisting of a dense mass of long narrow bracteoles and sepals with the small pinkish flowers sunk in amongst them.

Stem, stout, unbranched, leafy, 1–2′ in height, densely covered with long stiff hairs.

Leaves, 3–10″ in length by ½″ wide, exstipulate, alternate, linear-lanceolate, long acuminate, sessile, entire, with 3 prominent parallel veins on the under surface, densely covered with very long stiff hairs.

Flowers, ¼″ diam., in a dense terminal spike and sunk in amongst the long hairy bracteoles and sepals. In the same spike the flowers are pinkish, dark red-brown or almost black-purple, with the under surface of the corolla lobes brownish-yellow.

Bracteoles, 1–3″ in length by ⅛–¼″ wide, long, narrow, fine pointed, and densely covered with long hairs.

Calyx, of 5 long, narrow, fine pointed sepals 1″ to 1½″ by 1/16″, exceeding the corolla and densely covered with long silky hairs.

Corolla, salver-shaped with a long cylindrical tube ¾″ in length, 5-lobed, the lobes ⅛″, ovate, obtuse, spreading, the throat of the corolla tube without scales.

Stamens, 5, anthers in some flowers at the mouth of the corolla tube with the stigma at the middle of the tube, and in other flowers the anthers at the middle of the corolla tube and the stigma at the mouth of the corolla tube.

Ovary, 4-lobed, style thread-like, bi-fid with 2 capitate stigmas.

Fruit, of 4 nutlets on a flat receptacle.

Distinguishing characters. The long narrow leaves densely covered with very long stiff hairs distinguish it from other species.

Flowering Season. July, August.

Locality. At elevations of 10–13,000′. Frequent on Apharwat.

Distribution. Western Himalaya from Kashmir to Kumaon; Cabul.

Uses. The root possesses medicinal properties and is said to be useful in the treatment of diseases of the tongue and throat.

MACROTOMIA BENTHAMI, *DC.*

ATROPA BELLADONNA, *Linn.*

Deadly Nightshade or Belladonna.

Nat. Order. *Solanaceæ.* The Nightshade Family.

Name. The generic name is derived from the Greek "*Atropos*," one of the Fates, who was supposed to cut the thread of human destiny, referring to the poisonous properties of the plant. The specific name is due to the practice amongst Italian ladies of using belladonna to increase the apparent blackness of their eyes by dilating the pupils.

Description. A tall robust perennial with large simple leaves and greenish-yellow bell-shaped flowers.

Stems, 3–6′ in height, stout, solid, branched above, forming large open clumps of many stout annual stems from a thick creeping rootstock.

Leaves, exstipulate, alternate, entire, glabrous, elliptic or ovate-lanceolate, usually narrowed below, acuminate, acute or obtuse, 6–12″ by 2½–4″, petiole ½–1½″. In axils of the leaves there is usually a short branch bearing one or several small leaves.

Flowers, 1″ in length, greenish-yellow, single or in fascicles of 2–4 pedicelled flowers in the axils of the leaves.

Calyx, deeply 5-lobed, with short glandular hairs, persistent, the lobes becoming much enlarged in fruit.

Corolla, campanulate, ¾″ wide, 5-lobed, the lobes spreading. The basal portion is abruptly constricted and prominently 5-ribbed.

Stamens, 5, attached to the base of the corolla tube, alternate with the corolla lobes.

Ovary, 2-celled, style almost as long as the corolla.

Fruit, a globose black shining berry ¾″ diam., subtended by the persistent calyx with large spreading leafy lobes.

Distinguishing characters. There is no other species. The campanulate flowers distinguish it easily from *Phytolacca acinosa*, for which it is sometimes mistaken.

Flowering Season. August, September.

Locality. At elevations of 7–10,000′. Abundant at Gulmarg.

Distribution. Western Himalaya from Kashmir to Simla; Europe (including Great Britain) to the Caucasus and N. Persia.

Uses. A valuable medicinal plant, yielding atropine or belladonna. Atropine has the property of dilating the pupil of the eye. The roots and leaves are the parts of the plant used for medicinal purposes. The berries are very poisonous. It is not uncommon for leaves of the plant to be cooked and eaten by mistake for the leaves of *Phytolacca acinosa*, which they closely resemble, with disastrous results. For cases of poisoning, a strong emetic dose of magnesia and to keep the patient from dozing are the best precautions until medical aid is available.

ATROPA BELLADONNA, *Linn.*

UTRICULARIA FLEXUOSA, *Vahl.*

Nat. Order. *Lentibulariæ.* The Butterwort Family.

Name. The generic name is derived from the Latin word "*utriculus*," a little bladder, referring to the small bladders on the leaves. The English name for plants of this genus is "bladderwort."

Description. A slender floating aquatic plant, without roots, with hair-like divided submerged leaves bearing small bladders which are adapted for floating the plant and also for catching small water animals upon which the plant feeds. The flowers extend above the surface of the water, and are small, yellow and spurred.

Stem, slender, the greater portion submerged and often a foot or more in length and branched.

Leaves, all submerged, much divided into hair-like segments and bearing small globose bladders which float the plant.

Flowers, ⅓ ½″ diam., bright yellow with a darker orange centre, on an ebracteate leafless stem which extends 3-8″ above the surface of the water and bears about 3–5 pedicelled flowers.

Calyx, inferior, deeply 2-lobed.

Corolla, 2-lipped, spurred, the spur nearly as long as the lower lip.

Stamens, 2, attached to the base of the corolla.

Ovary, superior, globose, 1-celled, stigma unequally 2-lobed.

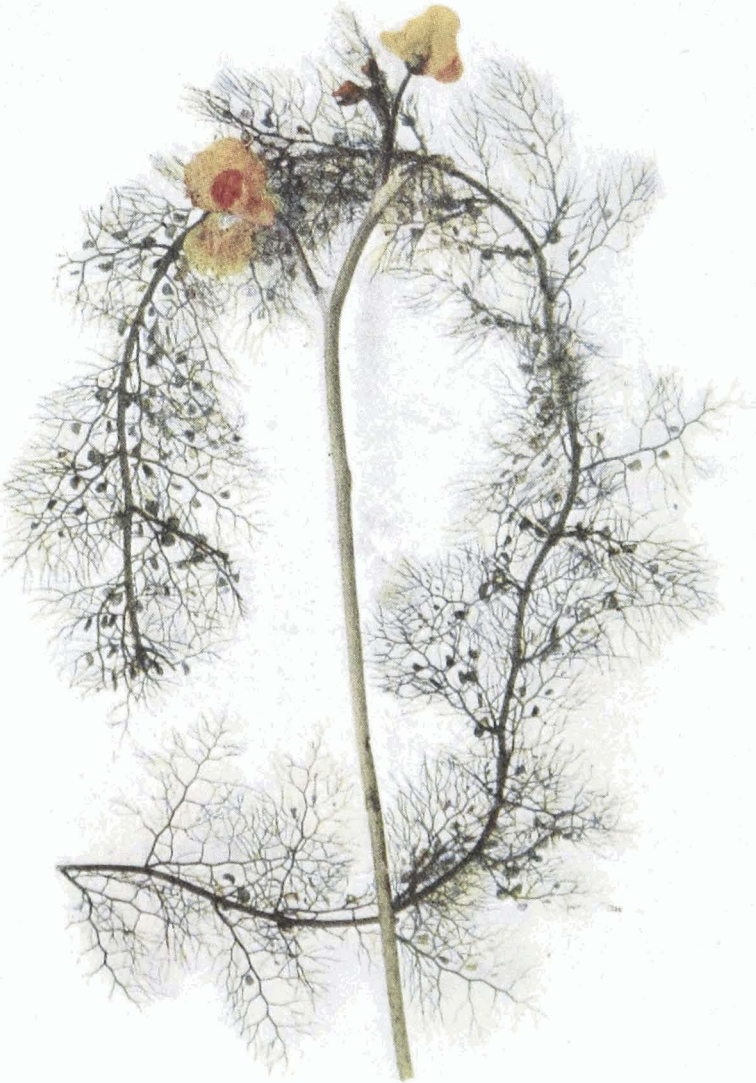
Fruit, a small globose capsule.

Distinguishing characters. The floating submerged stem and leaves and peduncles without bracts distinguish it from other species.

Flowering Season. Throughout the summer, May to August.

Locality. In ponds and lakes below 7000'. Abundant in the Dal Lake.

Distribution. Throughout India, S.E. Asia, Malaya, N. Australia.



UTRICULARIA FLEXUOSA, *Vahl.*

SALVIA HIANS, *Royle.*

Nat. Order. *Labiatæ.* The Labiate Family.

Name. The generic name is from the Latin "*salveo*," to be in good health, referring to the healing properties attributed to the sage *(Salvia officinalis)*. The name of the Natural Order is derived from the Latin "*labium*," a lip, referring to the 2-lipped form of the flowers of this order.

Description. A robust handsome perennial with large hastate leaves, and large 2-lipped dark blue flowers with the lower lip often blotched with white.

Stem, stout, square, 1–1½′ in height, viscidly hairy.

Leaves, exstipulate, opposite, hastate, long petioled.

Flowers, 1½″ in length, rich dark blue with the lower lip often blotched with white, in a raceme of lax few flowered whorls.

Calyx, campanulate, persistent.

Corolla, 2-lipped, lips broad, deep and gaping, the upper lip erect and slightly compressed, the lower lip 3-lobed with the lateral lobes spreading, throat of corolla tube very inflated.

Stamens, 2, inserted on the corolla tube. Filament short and jointed to the long connective which separates the two anther cells, one of which is perfect and contains the pollen and the other imperfect.

Ovary, free, 4-lobed, with the style inserted between the lobes.

Fruit, of 4 small 1-seeded nutlets.

Distinguishing characters. The large size and colour of the corolla distinguish it from other species.

Flowering Season. July, August.

Locality. At elevations of 8–11,000′. Common at Gulmarg.

Distribution. Not outside of Kashmir.

Fertilisation. The stamens in this genus are ingeniously adapted for cross-fertilisation by bees. The two cells of the anther are separated by a long connective which is jointed to the filament near the middle and acts like a lever. When a bee enters a flower, the front short arm of the connective with the imperfect anther cell is depressed, and the back arm bearing the perfect anther cell with the pollen is raised and bends over, transferring pollen to the back of the bee. On visiting another flower the pollen on the bee's back comes in contact with the stigma and cross-fertilisation is brought about. The lever-like action of the stamens can easily be tested by depressing the front arm of the connective with the point of a pencil.

SALVIA HIANS, *Royle*.

PHYTOLACCA ACINOSA, *Roxb.*

The Sweet Belladonna.

Nat. Order. *Phytolaccaceæ.* The Sweet Belladonna Family.

Name. The generic name is derived from "*phuton*," the Greek word for a plant, and "*lacca*," the name by which lac (from the Persian "*lak*," the lac-insect) used for dyeing purposes was first known in Europe, referring to the resemblance between the colour of the lac-dye and the crimson juice of the fruits of the plant. The specific name is derived from the Latin "*acinosus*," resembling grapes and referring to the fruits. The English name is due to the plant being often mistaken for *Atropa belladonna*.

Description. A tall, robust perennial which except for the flowers resembles *Atropa belladonna*. It has large simple leaves, and the flowers which are greenish-white are borne in a short, stout, erect raceme at the top of the stem.

Stem, stout, erect, succulent, hollow, 3–5′ in height, branched.

Leaves, exstipulate, alternate, undivided, entire, glabrous, elliptic or ovate-lanceolate, usually narrowed below, acuminate, acute or obtuse, petiole $\frac{1}{2}$–$1\frac{1}{2}$″ in length.

Flowers, $\frac{1}{4}$–$\frac{1}{3}$″ diam., greenish-white, in a leaf-opposed, erect, compact, many-flowered raceme, 2–6″ in length, pedicels stout, $\frac{1}{4}$″ long, but becoming longer in fruit.

Bracts, fine, linear, shorter than the pedicels.

Sepals, 5.

Petals, 0.

Stamens, usually 8–10.

Ovary, of about 6–10 carpels, arranged in a whorl and almost free, with short recurved style.

Fruit, succulent, purple or almost black, of about 10 nearly free ripe carpels, each containing a single black kidney-shaped seed.

Distinguishing characters. There is no other species. It may be distinguished from *Atropa belladonna* by the hollow stem and the erect raceme of small flowers.

Flowering Season. August.

Locality. At elevations of 7–9000′, usually in woods, *e.g.*, near Gulmarg, but not common. Abundant in the Machil nala of the Kishenganga Valley.

Distribution. Temperate Himalaya, Kashmir to Bhotan; China and Japan.

Uses. Certain American species possess narcotic properties, and it is considered that *P. acinosa* must possess similar properties. The leaves are eaten after being cooked, it being considered that the poisonous properties which produce delirium are destroyed by boiling. Cases not unfrequently occur of belladonna leaves being cooked and eaten by mistake for the leaves of *P. acinosa.* The leaves of *P. acinosa* are also often collected and exported either by mistake or intentionally for belladonna leaves and are known commercially as Sweet Belladonna leaves.

PHYTOLACCA ACINOSA, *Roxb.*

DAPHNE OLEOIDES, *Schreib.*

Nat. Order. *Thymeliaceæ.* The Daphne Family.

Name. The generic name is the Greek name for the Laurel, referring to a resemblance in the foliage of some species.

Description. A small, much branched perennial shrub with small entire leaves and clusters of waxy white flowers, usually found on hot dry slopes.

Stem, much branched, woody, 2–3′ in height.

Leaves, alternate, simple, sessile, rather thick, entire, mucronate, about 1–2½″ in length.

Flowers, ⅓″ in length, waxy white, in terminal clusters.

Perianth, tubular with 4 spreading lobes, hairy outside.

Stamens, 8.

Ovary, superior, 1-celled.

Fruit, fleshy, ellipsoid, ⅓″ diam., orange or scarlet.

Distinguishing characters. The small greyish-green leaves distinguish it from *D. cannabina*, which has long bright shining green leaves. From *D. retusa*, which is an Alpine species, it is distinguished by the mucronate leaves and hairy perianth.

Flowering Season. April, May. The fruits ripen in July.

Locality. At elevations of 3–7000′, on open hot slopes. Common on the Takht Hill at Srinagar.

Distribution. Western Himalaya from the Indus and Trans-Indus to Garhwal; Afghanistan and westwards to Italy.

Uses. The roots, bark and leaves are said to possess medicinal properties. It appears to be poisonous to animals, as it is not browsed by goats or camels.

DAPHNE OLEOIDES, *Schreib.*

HYDROCHARIS MORSUS-RANÆ, *Linn.*

Frogbit.

Nat. Order. *Hydrocharideæ.* The Frogbit Family.

Name. The generic name is derived from the Greek "*hudor*," water, and "*charis*," elegance. The specific name is from the Latin "*morsus*," a bit, and "*rana*," a frog. The local name in Kashmir is "Botkar."

Description. A floating aquatic annual with rounded leaves standing above the water and rather small delicate white flowers.

Roots, hanging down in the water, but not attached to the bottom.

Stem, the stems spread horizontally below the surface of the water, and develop buds from which new plants arise.

Leaves, 1½–3″ diam., rounded or kidney-shaped, undivided, entire, long petioled, standing erect above the surface of the water.

Flowers, 1½″ diam., white, of very delicate texture, diœcious (*i.e.*, the male and female flowers on different plants.)

Sepals, 3, small, oblong.

Petals, 3, spreading horizontally, crumpled.

Stamens, 6-9, with several staminodes.

Ovary, inferior, 6-celled, stigmas 6, linear 2-fid.

Fruit, ovoid, fleshy, 6-celled.

Distinguishing characters. No other species.

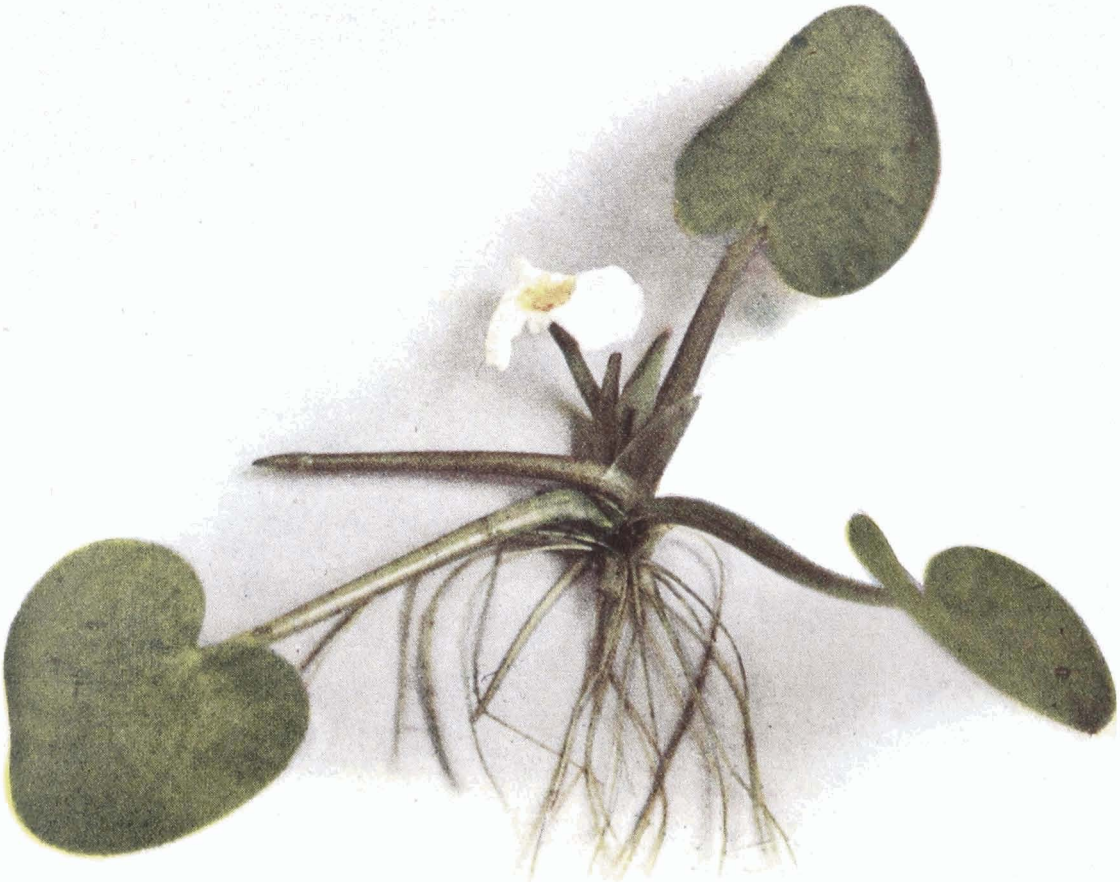
Flowering Season. July to September.

Locality. 5–6000′, in ponds and lakes. Very abundant in the Dal Lake.

Distribution. Kashmir, Bengal, Europe (including Great Britain), N. Asia, China, Japan, Java.

Uses. The plant is used in Kashmir as fodder for cattle.

Propagation. The plant rarely ripens its seeds, being chiefly propagated by winter dormant buds. After the flowering season is passed, the plants send out horizontal submerged stems which develop at their ends a large bud, which becomes detached and falls to the bottom, lying there dormant throughout the winter, and rising to the surface of the water in the spring and developing into a new plant.



HYDROCHARIS MORSUS-RANÆ, *Linn.*

SPIRANTHES AUSTRALIS, *Lindl.*

Nat. Order. *Orchideæ.* The Orchid Family.

Name. From the Greek "*speira*," a spiral, and "*anthos*," a flower, referring to the spiral arrangement of the flowers. The English name for plants of this genus is "lady's tresses."

Description. A small perennial easily recognised by the twisted spike of small white flowers forming a spiral.

Root, of many thick fleshy fibres.

Stem, erect, 6-12″ in height.

Leaves, on lower part of the stem, linear-lanceolate, simple, entire.

Flowers, about $\frac{1}{8}$″ in length, white or sometimes pinkish, spirally arranged on a twisted spike.

Sepals and petals forming a small erect hood, the lateral sepals produced downwards at the base, lip oblong with a saccate base.

Distinguishing characters. No other species.

Flowering Season. July to September.

Locality. At low elevations and ascending to 8000′, usually on open grassy land, *e.g.* Harwan near Srinagar.

Distribution. Throughout India; Afghanistan; N. Asia, China, Japan, Australia, New Zealand.

SPIRANTHES AUSTRALIS, *Lindl.*

CYPRIPEDIUM CORDIGERUM, *Don.*

West Himalayan Lady's Slipper.

Nat. Order. *Orchideæ.* The Orchid Family.

Name. From the Greek "*Kupris*," Venus, and "*pedion*," a slipper, referring to the shape of the lip. The English name of the closely allied British species, *C. calceolus*, is "lady's slipper."

Description. A very handsome terrestrial orchid, with a solitary flower (rarely 2 flowers) with a large inflated white lip.

Stem, 6–18″, robust, leafy.

Leaves, several, alternate, plaited, nearly orbicular to lanceolate.

Flower, solitary (rarely 2 flowers) and terminal, about 3″ diam., greenish-yellow except the lip, which is white.

Bract, 1–4″, leaf-like.

Sepals, 3, narrow, ovate-lanceolate, acuminate.

Petals, the lateral ones similar to the sepals; lip, 1–1¼″ in length, white, the side lobes small, the mid lobe very large and inflated.

Ovary, 1-celled.

Fruit, a capsule about 1½″ in length.

Distinguishing characters. No other species. Easily recognised by the large inflated white lip, and only differing from the British species by the colour of the flower.

Flowering Season. June, July.

Locality. At elevations of 8–10,000′. Abundant at Gulmarg.

Distribution. Temperate Himalaya from Kashmir to Kumaon.

CYPRIPEDIUM CORDIGERUM, *Don.*

EPIPACTIS LATIFOLIA, *Sw.*

The Broad-leaved Helleborine.

Nat. Order. *Orchideæ.* The Orchid Family.

Name. The name is of Greek origin, but its application is uncertain.

Description. A terrestrial perennial orchid with a long terminal raceme of greenish and dingy red-purple flowers.

Stem, erect, leafy, 1–2′ in height.

Leaves, sessile, plaited, orbicular to ovate-lanceolate.

Flowers, ½–⅔″ diam., in a terminal raceme, the sepals and lateral petals green or yellowish-green and the lip dingy red-purple.

Sepals and lateral petals, lanceolate, acute.

Lip, ¼″, the basal portion bowl-shaped, and the terminal portion shorter, flat and triangular or ovate-cordate.

Distinguishing characters. There are two other species to which it is closely allied and from which it may be distinguished as follows:—

E. latifolia. Basal portion of the lip (the hypochile) sub-globose, the terminal portion (the epichile) ovate-cordate with 2 basal protuberances. Flowers, ⅓–⅔″ diam.

E. consimilis. Hypochile narrow oblong, epichile lanceolate. Flowers, 1–1½″ diam.

E. Royleana. Hypochile large, bowl-shaped, very much broader than the ovate or ovate-lanceolate epichile. Flowers, 1″ diam.

Flowering Season. July, August.

Locality. At elevations of 7–10,000′ in woods. Common near Gulmarg.

Distribution. Temp. Himalaya from Kashmir to Sikkim, Europe (including Great Britain), N. Africa, N. Asia to Japan.

EPIPACTIS LATIFOLIA, *Sw.*

LILIUM POLYPHYLLUM, *Don.*

Nat. Order. *Liliaceæ.* The Lily Family.

Name. The derivation of the generic name is not clear, but may be from the Greek "*leirion*," a lily.

Description. A robust tall perennial, with handsome large pendulous flowers which are greenish-white with the inside dotted and streaked with red-purple.

Stem, 2–4′ in height.

Leaves, sessile, alternate, or nearly opposite or whorled, narrowly lanceolate or linear.

Flowers, 2–3″ in length, greenish outside, white within, speckled and streaked with red-purple, in racemes of about 3–10 pedicelled and pendulous flowers.

Perianth, broadly funnel-shaped of 6 free segments, with the upper portions recurved.

Stamens, 6, opposite the perianth segments.

Ovary, narrowly oblong, 3-celled, grooved.

Fruit, a capsule 1–1¼″ long, angled, 3-valved.

Distinguishing characters. Easily distinguished from other species by the colour of the flowers.

Flowering Season. June, July.

Locality. At elevations of 6–10,000′, Gulmarg, Sonamarg.

Distribution. W. Temp. Himalaya from Kashmir to Kumaon; Afghanistan.

LILIUM POLYPHYLLUM, *Don.*

FRITILLARIA IMPERIALIS, *Linn.*

Crown Imperial.

Nat. Order. *Liliaceæ.* The Lily Family.

Name. From the Latin "*fritillus*," a dice-box, referring to the markings on the flowers of some species which resemble a chequered board, which usually accompanies the dice-box.

Description. A tall, handsome, robust perennial, with whorls of narrow leaves and a terminal umbel of large pendulous bell-shaped flowers of a brownish-orange colour.

Bulb, large, round, of broad fleshy scales, strong smelling.

Stem, stout, 2–4′ in height, leafless on lower portion.

Leaves, lanceolate, sessile, the lower ones opposite, the upper ones longer and in whorls.

Flowers, about $1\frac{1}{2}$–$2\frac{1}{2}$″ in length, brownish-orange colour, in a terminal umbel of about 5–8 pedicelled and pendulous flowers.

Perianth, broadly campanulate, of 6 free segments.

Ovary, 3-celled, stigma 3-fid, with spreading lobes.

Fruit, a capsule 2″ long, obovoid, almost 6-winged.

Distinguishing characters. The terminal umbel and colour of the flowers distinguish it from other species.

Flowering Season. March, April.

Locality. At elevations of 5–7000′. In great profusion on the hillside near Baramulla.

Distribution. Western Himalaya, Kashmir westwards to Kurdistan.

FRITILLARIA IMPERIALIS, *Linn.*

TULIPA STELLATA, *Hook.*

The Himalayan Star-flowered Tulip.

Nat. Order. *Liliaceæ.* The Lily Family.

Name. The generic name is from the Persian "*tuliban*," a turban, referring to the shape of the flowers of some species. The specific name is from the Latin "*stella*," a star, referring to the star-like form of the fully expanded flowers.

Description. A very pretty bulbous perennial with long, narrow, simple leaves and a solitary terminal flower which is white with rose-pink blotches on the outside.

Bulb, coated, the scales woolly within, about 1″ diam.

Leaves, several radical leaves which are long, linear, sessile, simple, glabrous, 4–10″ in length, sometimes wavy.

Flowering stem, 4–12″ in length.

Flowers, 1½–2″ in length, erect, terminal, solitary, white with the outside blotched with bright rose-pink.

Perianth, of 6 free segments, all alike, widely spreading in full sunlight to the form of a 6-pointed star.

Stamens, 6.

Ovary, with a narrow neck, stigmas 3.

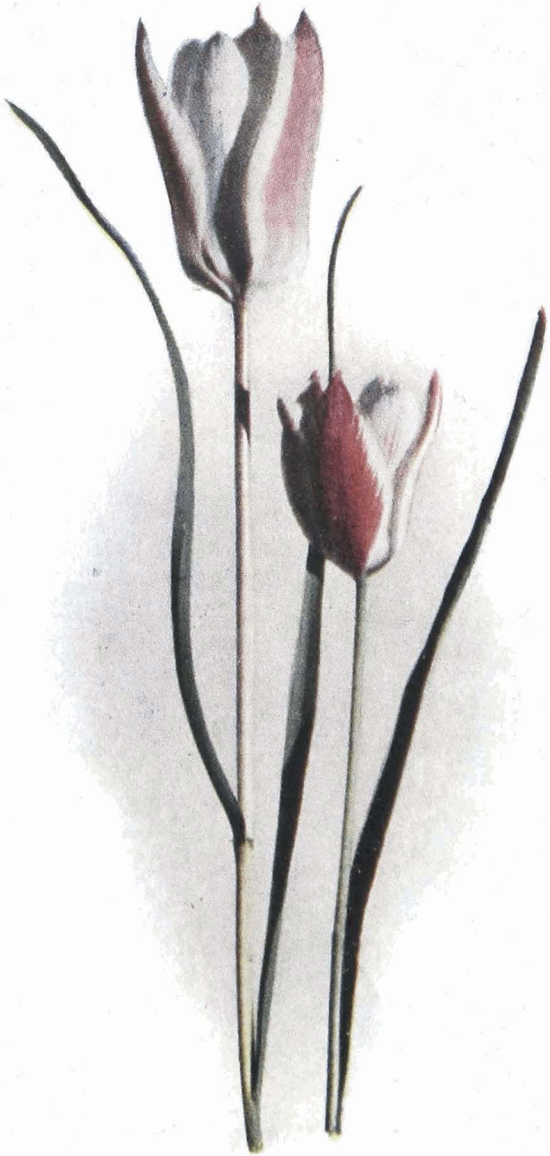
Fruit, a capsule.

Distinguishing characters. No other species.

Flowering Season. April, May.

Locality. At elevations of 4–6000′. Abundant in fields and open waste grass lands at Srinagar and throughout the valley.

Distribution. Temperate Western Himalaya from Kashmir to Kumaon.



TULIPA STELLATA, *Hook.*

COLCHICUM LUTEUM, *Baker.*

Yellow-flowered Saffron.

Nat. Order. *Liliaceæ.* The Lily Family.

Name. The generic name is of Greek origin from Colchis, a country famous for medicinal herbs. The specific name is from the Latin "*luteus*," yellow. The British species, *Colchicum autumnale*, is known as the Meadow Saffron, and has purple flowers. The plant which yields the saffron dye is *Crocus sativus* (the Saffron Crocus), which has a blue-purple flower, the dye being obtained from the red stigmas only.

Description. A small perennial with a few radical leaves and a golden-yellow crocus-like flower.

Stem, the base of the stem below ground is thickened into a solid, thick, fleshy ovoid body termed a corm.

Leaves, all radical, appearing with the flowers and becoming much elongated after the flowering season is passed, linear, obtuse.

Flowering stem or scape, very short, bearing 1 or 2 flowers.

Flowers, 1–1½″ diam., erect, golden-yellow.

Perianth, funnel-shaped, with a very long tube 3–4″ in length, and with 6 ob-lanceolate segments.

Stamens, 6, inserted at the bases of the perianth segments, included, shorter than the perianth segments, filaments shorter than the long yellow anthers.

Ovary, superior, sessile, 3-celled, styles 3, long and thread-like.

Fruit, a capsule 1–1½″ in length, the valves with long recurved beaks.

Distinguishing characters. No other species. The 6 stamens and superior ovary distinguish it from the genus *Crocus*, which has only 3 stamens and an inferior ovary, and belongs to the Natural Order *Irideæ*, the Iris Family.

Flowering Season. February, March. One of the earliest flowers to appear in the neighbourhood of Srinagar.

Locality. At elevations of 3–6000′, on waste grass lands. Abundant near Srinagar and on the roadside from Garhi to Baramulla.

Distribution. West Temperate Himalaya, Chamba, Afghanistan, Turkestan.

Uses. All parts contain the poisonous alkaloid Colchicine, which is used in medicine for relieving pain. The plant is poisonous to cattle.

COLCHICUM LUTEUM, *Baker*.

CALENDAR SHOWING THE MONTH OI FLOWERING OF THE SPECIES ILLUSTRATED.

FEBRUARY.

Colchicum luteum.

MARCH.

Fritillaria imperialis.
Saxifraga ligulata.

APRIL.

Daphne oleoides.
Tulipa stellata.

MAY.

Anemone obtusiloba.
Pæonia emodi.
Podophyllum emodi.
Nymphæa alba.
Primula denticulata.
Primula rosea.
Skimmia laureola.
Utricularia flexuosa.

JUNE.

Anemone tetrasepala.
Adonis chrysocyathus.
Caltha palustris.
Trollius acaulis.
Actæa spicata.
Geranium Wallichianum.
Dictamnus albus.
Rhododendron campanulatum
Primula Stuartii.
Gentiana carinata.
Polemonium cæruleum.
Cypripedium cordigerum.
Lilium polyphyllum.

JULY.

Potentilla argyrophylla.
Saxifraga flagellaris.
Scabiosa speciosa.
Aster diplostephioides.
Codonopsis ovata.
Primula reptans.
Mertensia tibetica.
Macrotomia Benthami.
Salvia hians.
Hydrocharis morsus-ranæ.
Spiranthes australis.
Epipactis latifolia.
Cremanthodium Decaisnei.

AUGUST.

Clematis grata.
Clematis connata.
Cimicifuga fœtida.
Meconopsis aculeata.
Lavatera Kashmiriana.
Sedum Ewersii.
Morina longifolia.
Saussurea Lappa.
Atropa Belladonna.
Phytolacca acinosa.

SEPTEMBER.

Swertia petiolata.

LIST OF MEDICINAL PLANTS ILLUSTRATED.

Actæa spicata (Baneberry).
Anemone obtusiloba.
Atropa Belladonna (Belladonna).
Cimicifuga fœtida.
Codonopsis ovata.
Colchicum luteum.
Daphne oleoides.
Dictamnus albus.
Geranium Wallichianum.
Macrotomia Benthami (Kahzaban).
Meconopsis aculeata.
Nymphæa alba.
Pæonia emodi (Peony; Mamekh).
Phytolacca acinosa.
Podophyllum emodi.
Rhododendron campanulatum
Saussurea Lappa (Kuth).
Skimmia laureola (Ner).

LIST OF SHRUBS, CLIMBERS, AQUATIC PLANTS AND ROCK PLANTS ILLUSTRATED.

SHRUBS.

Daphne oleoides.
Rhododendron campanulatum
Skimmia laureola.

CLIMBERS.

Clematis connata.
Clematis grata.

AQUATIC PLANTS.

Caltha palustris, var. alba.
Hydrocharis morsus-ranæ.
Nymphæa alba.
Utricularia flexuosa.

ROCK PLANTS.

Saxifraga ligulata.
Sedum Ewersii.

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