

ON A COLLECTION OF PLANTS FROM LAHUL

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ABSTRACT

The paper gives an account of the vegetation as observed by the author during a recent plant collection tour in the Chandra and Bhaga river valleys of Lahul (Kangra District, Panjab) beyond the Rohtang Pass. Plants were collected in the altitude range 3000 to 4000 metres and the paper includes a list of plants collected with brief descriptions, altitude of occurrences and uses, if any.

During the summer of 1958 the author visited some parts of the Punjab Himalayas in the Kangra and Kulu Sub-Divisions ($32^{\circ}00'$ to $32^{\circ}45'$ N and $77^{\circ}00'$ to $77^{\circ}15'$ E) including the picturesque Lahul Valley for the collection of plants for the Botanical Survey of India. The Lahul Valley is situated beyond the Rohtang Pass (4000 m.) and is drained by the two main rivers, Chandra and Bhaga which confluence at Tandi near Keylang to form the Chandrabhaga which in its further course is known as the Chenab. This valley, no place in which is situated at an altitude less than 3000 m., is surrounded by a circle of high mountains and numerous glaciers. There are also many pretty water-falls and numerous hill streams to add to the charm of the valley. The hill slopes upto about 4000 m. show lush vegetation, particularly around streams which are fed by melting snow but at higher altitudes the general barrenness of vegetation is evident. The rainfall at higher altitudes is rather scanty and severe climatic conditions prevail over the greater part of the year. This valley has attracted the attention of botanical collectors in the past and the first published account of its flora dates back to 1868 wherein a brief description of the vegetation and a list of plants collected has been given. In recent years the most comprehensive collection of plants of the valley has come from N. L. Bor who in the year 1941 spent more than three months in the valley and brought back an almost complete collection of plants which are now housed in the herbarium of Forest Research Institute at Dehra Dun. A. C. Joshi (1952) has published a short account of the aquatic vegetation of Lahul. The only other account of Lahul plants is that of Watt (1881).

The present paper includes a brief description of the vegetation as observed during this recent tour in Lahul and a list of plants collected. The Chandra river valley from Rohtang to Tandi and the Bhaga valley from Tandi to Keylang may be taken as the areas covered by this account.

Leaving Manali, the last bus station in Kulu, the road winds its way through thick cedar forests along the Beas river. Some of the roadside shrubs and trees are *Spiraea lindleyana*, *Euonymus hamiltonianus*, *Ilex*

diphyrena and *Alnus nitida*. *Tilia europea* and *Castanea sativa* have been planted in the cedar forests near Manali. Among the herbs met with on the way from Manali to Kothi the most conspicuous are the blue flowered *Parochetus communis* and *Gnaphalium luteoalbum* with its ash white vegetative parts and bright yellow heads. The fern, *Onychium multisectum* and a species of *Arisaema* are the other common herbs seen everywhere. Nearing Kothi, *Wickstroemia canescens* was found in abundance as also *Caltha palustris* near about streams and other moist places. Kothi rest house is situated amidst cedar trees in a picturesque setting. Leaving Kothi one passes through a dense forest of conifers till Rahla beyond which the trees gradually disappear. Near Rahla were found *Polygonum amplexicaule* and *Wulfenia amherstiana*. Above Rahla a steep ascent brings one to a flat meadow at an altitude of about 3500 m. where the grassy slopes are covered by a profusion of *Anemone*, *Potentilla* and *Paracaryum*. *Thermopsis barbata*, a woolly legume with bright blue flowers was seen growing gregariously on the slopes here. There are no trees at this altitude and on the rocky slopes, *Rhododendron lepidotum* and *Meconopsis aculeata* are seen. Among the herbs seen, as one proceeds towards the Rohtang pass, are *Saxifraga flagellaris* with its peculiar thread-like surculi and yellow flowers, species of *Sedum*, *Primula* and others. Approaching Rohtang Pass, patches of snow were still evident along the path and on rocks where the snow was just melting, the red *Primula rosea* appeared very prominent. Along the Rohtang Pass itself, the exposed rock surfaces were covered by a great profusion of pretty herbs among which may be mentioned species of *Primula*, *Pedicularis*, *Androsace*, *Anemone* and *Trollius*. One characteristic plant met with on the Rohtang Pass and which is restricted to a limited area there is the blue flowered *Lagotis glauca* of the Selagineae. *Gaultheria trichophylla*, *Cassiope fastigiata*, *Sedum* spp. and *Thalictrum alpinum*, a tiny plant with greenish flowers are the other herbs in the rocky crevices and on hill slopes along the Pass. Crossing the Rohtang Pass one gets a panoramic view of the Lahul Valley with the Chandra river rushing fast in between mountains of

great height. The hill slopes near the villages present a lush appearance with well laid out plots for cultivation. In other places the hill slopes are covered by a great variety of temperate and alpine herbs. *Allium victorialis* and *Gagea lutea* were among the plants collected here. The several boraginaceous species with their bright blue flowers form a conspicuous element of the vegetation along with *Iris* spp. and *Nepeta* spp. Near Khoksar, perched high up on rock edges were clumps of *Rheum webbianum*. *Rumex* sp. and *Hyoscyamus* are prominent among the cultivated herbs.

Leaving Khoksar, the Chandra river is crossed by a bridge and the road winds its way along the river to Sissu. Here the conditions are much drier and the hill slopes present bare rocks in many places. The thistle-like *Cousinia thomsonii* is prominent here but further up along the road, numerous cruciferous herbs, species of *Arabis*, *Barbarea*, *Sisymbrium* and others are met with. Near about the streams the vegetation is more lush and it is particularly noticed that *Caltha palustris* is the most conspicuous with its bright yellow flowers. Species of *Anaphalis*, *Polygonum* and *Pedicularis* are also common along water margins. A solitary specimen of the famed blue poppy, *Meconopsis aculeata* was found amidst the rocks near Sissu and *Scrophularia scabiasae-folia* was quite common on the dry slopes.

Near Sissu village, the Chandra river forms an outlet in the form of a large lake and herein were observed large floating clumps of *Polygonum amphibium*. *Salix oxycarpa* and *Populus ciliata* have been planted on the banks of the river and around villages. The hill slopes in the neighbourhood of Sissu village are covered by a great profusion of *Caltha*, *Phlomis*, *Orchis* and other herbs with attractive flowers. Here are also seen in cultivation *Hyoscyamus niger* and *Saussurea lappa*. The latter is reputed as a medicinal plant and is locally known as 'Kuth'.

Between Sissu and Gondla the same general aspect of the vegetation is noticed but on the drier hill slopes the most conspicuous plant is the spinescent *Morina coulteriana* with its yellow flowers (Fig. 1). This plant of the Dipsacaceae is characteristic of the sub-alpine Himalayas in the altitude range 3000 to 4000 m., extending from Kashmir to Garhwal. *Rosa* sp. and *Berberis jaeschkaeana* were among the few shrubs met with here. Approaching Gondla another characteristic Lahul plant of the drier regions appears, the large attractive *Eremurus himalaicus*. *Ephedra gerardiana* was seen occasionally on the dry rocky edges. The peculiar *Saxifraga saginoides* with its cushion-like habit was another interesting plant seen on rock surfaces. The hills around Tandi, where the two rivers Chandra and Bhaga meet were carefully searched for plants and among the interesting species obtained here may be mentioned, *Physochlaina praelata*, *Cortusa matthioli*, *Isopyrum anemonoides*, *Sedum rhodiola*, *Mertensia echioides*, *Allium rubellum*, the parasitic *Orobancha epithymum* and the boraginaceous *Macrotomia benthamii*, a plant of medicinal importance. Near the cultivated fields and

in irrigated meadows were seen *Codonopsis ovata*, *Gentiana detonsa*, *Pedicularis pectinata* and *Triglochin palustre*.

Leaving Tandi, one passes through a thick grove of *Salix*, amidst which is situated the Tandi camping site. The road proceeds further along the Bhaga river bank to Keylang and the hill slopes on the way are quite bare and show only sparse vegetation but approaching Keylang, the entire aspect is changed to one of a bright verdure on account of the extensive cultivation carried on in terraces on the hill slopes. Keylang village itself is situated amidst such picturesque surroundings.

The above account gives a general idea of the vegetation of the Lahul valley and the appended list includes plants which were collected during this tour. Brief descriptions of the plants and localities where collected have been given.

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LIST OF PLANTS COLLECTED

RANUNCULACEAE

Anemone rupicola Camb. FBI. I: 8.

A hairy herb on rocks with cream white flowers, nearly 6 cms dia. Radical leaves petiolate, petioles 4 cms long, 3-partite, segments toothed and cut. On a hill slope near Tandi, 3300 m. M. A. Rau 5991.

A. obtusiloba D. Don. FBI. I: 8.

A densely tufted hairy herb with trilobed leaves and lemon yellow flowers, 3 cms dia, sepals 5. On hill slopes near Rohtang Pass, 4000 m. M. A. Rau 6080.

A. rivularis Ham. FBI. I: 9.

An erect hairy herb with white flowers about 2 cms across, sepals silky outside.

Common on hill slopes and in moist situations. Kothi, Sissu, 2500-3200 m. M. A. Rau 5814 & 5929.

Thalictrum alpinum L. FBI. I: 12.

A small herb on rocks nearabout snow. Leaves pinnate with small 3-lobed leaflets 3 mm long. Flowers small greenish in lax racemes.

Rohtang Pass, 4000 m. M. A. Rau 5834.

T. minus L.

A large herb. Leaves sheathing. Leaflets nearly 1 cm long 3-lobed, lobes toothed. Achenes about 6, ribbed narrowed towards both ends.

On a hill near Tandi, 3300 m. M. A. Rau 6016.

Ranunculus hirtellus Royle. FBI. I: 18.

A herb in moist situations with yellow flowers. Khoksar-Sissu, 3200 m. M. A. Rau 5907.

R. laetus Wall. FBI. I: 19.

A tall herb 40-48 cms. Leaves hairy trilobed, lobes deeply cut. Flowers 2-3 cms across, yellow. Achenes many, oval flattened in a globose head.

Sissu, near water margins. M. A. Rau 6070.

Oxygraphis polypetala Hook. f. & Thoms. FBI. I:21.
A small tufted herb on hill slopes. Leaves small cordate, 0.6 cm, petiole 1-2 cm. Flowers yellow with 10-12 petals and persistent calyx. Near Khoksar, 3200 m. M. A. Rau 6095.

Caltha palustris Linn. FBI. I:21.
A common herb of moist regions found most prominently on either side of streams along hill slopes. The cordate leaves, 10 cms dia. and may be even larger. Flowers 2-4 cms dia., yellow.
Very common throughout, Kothi-Gondla, 2500-3500 m. M. A. Rau 5797.

Trollius acaulis Lindl. FBI. I:22.
A perennial herb of alpine grassy slopes with palmate 5-partite leaves, deeply cut, 6 cms dia., petiole sheathing, 4 cms long. Flowers orange-yellow, nearly 5 cms across.
Rohtang pass, 4000 m. M. A. Rau 5830 & 6097.

Isopyrum thalictroides Linn. = *I. anemonoides* Kar. & Kir. FBI. I:23.
A delicate herb 12-14 cms high in a rock crevice near dripping water. Leaves dissected, lobes entire, membranous. Flowers white, 1 cm. dia., anthers orange-yellow. Follicles 4 with persistent beaked styles. Tandi, 3500 m. M. A. Rau 6019.

Aquilegia vulgaris L. FBI. I:24.
A large herb in a rock crevice. Leaves compound, leaflets 2.5 cms, lobed. Flowers large white 6 cms across, spur of petal 1.5 cms, straight.
Near Gondla, 3500 m. M. A. Rau 5989.

Delphinium incanum Royle. FBI. I:25.
A herb 30 cms high on rocky slopes. Leaf segments very slender. Flowers sky-blue, spur 1.5 cms straight. Follicles 3, 1.5 cm long.
Near Kothi, 2500 m. M. A. Rau 5802.

D. denudatum Wall. FBI. I:25.
A large herb on rocky slopes. Flowers blue 3 cms across. Spur straight flattened at the base.
Near Kothi, 2500 m. M. A. Rau 5801.

BERBERIDACEAE

Berberis vulgaris L. FBI. I:109.
A low shrub with spinescent serrulate leaves and yellow flowers in racemes.
Near Kothi, 2500 m. M. A. Rau 5810.

B. jaeschkaena C. K. Schneider.
A rigid shrub with yellow flowers 1 cm dia.
Sissu-Gondla, on hill slopes, 3200 m. M. A. Rau 5936.

Podophyllum emodi Wall.
A stout herb with reddish berry.
Near Gondla village, perhaps in cultivation here, 3300 m. M. A. Rau 6053.

PAPAVERACEAE

Meconopsis aculeata Royle. FBI. I:118.
A tall spinescent herb with sky blue flowers 4-5 cms dia.
Amidst rocks on hill slope and underneath the bridge near Sissu village, 3200 m. M. A. Rau 5913 & 6069.

FUMARIACEAE

Corydalis ramosa Wall.
A herb with dissected leaves and yellow spurred flowers.
Tandi, 3500 m. M. A. Rau 6000.

CRUCIFERAE

Barbarea vulgaris R. Br. FBI. I:134.
An erect herb with furrowed stem and lyrate-pinnate basal leaves. Flowers yellow. The herb has a distinct aroma.
Khoksar, 3200 m. M. A. Rau 5862, 5890 & 5974.

Arabis glabra Crantz. = *Turritis glabra* L. FBI. I:135.
An erect herb with auricled, entire cauline leaves, 5 cms long. Flowers white in terminal raceme.
Sissu, 3200 m. M. A. Rau 5893.

A. pterosperma Edgew. = *A. alpine* L. FBI. I:135.
An erect hairy herb 15-20 cms, with auricled sessile leaves 1.5-2 cms. Flowers pinkish in terminal racemes. Pods nearly 2 cms very slender.
Rohtang, 4000 m. M. A. Rau 5853 & 5869.

Arabis sp.
A delicate herb with entire cuneate leaves, white flowers and flattened linear pods. Resembles *A. alticola* O. E. Schulz but there are no cauline leaves.
Tandi, 3500 m. M. A. Rau 6028.

Cardamine impatiens L.
An erect annual with small white flowers.
Khoksar, in moist situations, 3400 m. M. A. Rau 5867.

Sisymbrium molissimum C. A. Mey. FBI. I:147.
An erect herb with sessile cauline leaves and white flowers.
Rohtang, 4000 m. M. A. Rau 5832.

Arabidopsis himalaica (Edgew.) O. E. Schulz.
= *Sisymbrium himalaicum* Hook. f. & Thoms. FBI. I:147.
An erect herb 12-15 cms with stem clasping leaves and purple flowers in terminal close racemes.
Rohtang, 4000 m. M. A. Rau 5833.

A. thaliana (L.) Heyn.
= *Sisymbrium thalianum* (L.) Gay. FBI. I:148.
A branched herb with simple leaves and small white flowers. Pods slender nearly 1 cm long. Pedicels 1 cm.
Khoksar, 3300 m. M. A. Rau 5886 & 6073.

Capsella bursa-pastoris (L.) Medic. FBI. I: 159.

An erect herb with pinnatifid radical leaves, white flowers and flattened obcordate pods.

Kothi-Khoksar, 2800-3400 m. M. A. Rau 5790 & 5868.

VIOLACEAE

Viola biflora L. FBI. I: 182.

A herb with yellow flowers.

Rohtang, 4000 m. M. A. Rau 6081 & 6085.

CARYOPHYLLACEAE

Dianthus angulatus Royle. FBI. I: 215.

A small herb with white to pale pink flowers, margins of petals fringed.

Khoksar-Sissu, 3400 m. M. A. Rau 5897 & 5945.

Gypsophila cerastioides D. Don. FBI. I: 217.

A small herb with oval sessile cauline leaves and campanulate flowers with purple streaks.

Rohtang, 4000 m. M. A. Rau 5840.

Silene inflata Smith. FBI. I: 218.

A large herb in cultivated fields with inflated calyx and white petals.

Tandi, 3500 m. M. A. Rau 6003.

Arenaria foliosa Royle. FBI. I: 236.

A small herb growing in clumps with needle-like leaves 0.5 cm long and white flowers.

Very common in moist places and along streams. Khoksar—Gondla, 3300 m. M. A. Rau 5857, 5870, 5941 & 5968.

A. serpyllifolia L.

A small herb with opposite oval leaves and white flowers.

Near Manali, 2000 m. M. A. Rau 5764.

MALVACEAE

Malva rotundifolia L. FBI. I: 320.

A prostrate herb with thick root stock and pale-violet flowers 1.5 to 2 cms across.

Manali-Tandi, 2000-3500 m. M. A. Rau 5794 & 5980.

LINACEAE

Linum perenne L. FBI. I: 411.

A perennial herb with blue flowers 2 cms dia.

Tandi, 3500 m. M. A. Rau 6050.

GERANIACEAE

Geranium wallichianum Sw. FBI. I: 430.

Very common on grass slopes. Flowers large 3-4 cms dia., corolla bluish with purple streaks.

Khoksar-Tandi, 3200 m. M. A. Rau 5896.

Impatiens roylei Wall. FBI. I: 469.

A soft erect herb with violet-purple flowers.

Kothi, 2500 m. M. A. Rau 5773.

I. sulcata Wall. FBI. I: 469.

A tall herb with grooved stem and rose-white flowers.

Manali-Kothi, 2000-2600 m. M. A. Rau 5954.

ILICINEAE

Ilex diphyrena Wall. FBI. I: 599.

A small tree with globose fruits.

Near Kothi, 2500 m. M. A. Rau 5769.

CELASTRACEAE

Euonymus hamiltonianus Wall. FBI. I: 612.

A large shrub on rock with four-lobed fruits.

Near Kothi, 2500 m. M. A. Rau 5782.

RHAMNACEAE

Rhamnus dahuricus Pall. FBI. I: 639.

A small tree with spines and small ovoid fruits.

On a rock with *Euonymus* near Kothi, 2500 m. M. A. Rau 5783.

LEGUMINOSAE

Thermopsis barbata Royle. FBI. II: 62.

An erect woolly herb nearly 30 cms tall, with large dark purple-blue flowers.

On slopes often gregarious near Rohtang Pass, 3500-4000 m. M. A. Rau 5816 & 6104.

Trifolium repens L. FBI. II: 86.

A creeping herb common on hill slopes throughout. Flowers white in heads.

Kothi-Keylang, 2500-3500 m. M. A. Rau 5884.

Parochetus communis Ham. FBI. II: 86.

A creeping herb with long petioled leaves and bluish flowers nearly 1 cm.

Kothi, 2500 m. M. A. Rau 5759.

Medicago falcata L. FBI. II: 90.

A tall herb in cultivated fields with yellow flowers.

Tandi, 3500 m. M. A. Rau 6025.

M. lupulina L. FBI. II: 90.

A trailing annual with yellow flowers.

Tandi, 3300 m. M. A. Rau 5979.

Lotus corniculatus L. FBI. II: 91.

A perennial herb with yellow flowers.

Common on grassy slopes, Sissu, 3200 m. M. A. Rau 5932.

Indigofera hebeptala Benth. FBI. II: 101.

A shrub on rocks with reddish flowers in racemes.

Manali-Kothi, 2500 m. M. A. Rau 5775.

Astragalus rhizanthus Royle. FBI. II: 131.

A herb with long tap root and leaves spreading on ground. Flowers yellow at the crown of rootstock.

Khoksar-Sissu, 3200 m. M. A. Rau 5877.

Astragalus sp.

A herb with long rootstock, branches trailing with pinnately compound leaves, leaflets alternate, hairy oval not more than 0.5 cm long. Flowers purple in heads on peduncle nearly 3-4 cms long.

Khoksar-Sissu, 3200 m. M. A. Rau 5878.

Oxytropis thomsonii Benth. FBI. II: 137.

A tufted herb with odd pinnate leaves, leaflets greyish, hairy and acute. Flowers purple in dense heads.

Common throughout on grassy slopes. Khoksar-Gondla, 3200 m. M. A. Rau 5849 & 5944.

Oxytropis sp.

A tufted herb with small greyish hairy leaflets and pinkish flowers in close hairy heads.

Gondla, 3300 m. M. A. Rau 5984.

Desmodium tiliaefolium Don. FBI. II: 168.

A shrub with violet blue flowers in racemes.

Manali-Kothi, 2500 m. M. A. Rau 5785.

ROSACEAE

Prunus cornuta Wall.

= *P. padus* L. FBI. I: 315.

A small tree perhaps cultivated, near Gondla village, 3300 m. M. A. Rau 5976.

Spiraea vestita Wall. FBI. II: 323.

A herb perched high up on rocks with 5-lobed acutely toothed leaves. Flowers small in cymes.

Tandi, 3500 m. M. A. Rau 6046.

S. lindleyana Wall.

= *S. sorbifolia* L. FBI. II: 324.

A tall shrub with white flowers.

Near Manali, 2200 m. M. A. Rau 5760.

S. canescens D. Don. FBI. II: 325.

A shrub on rocks along the Beas river bank.

Near Manali, 2200 m. M. A. Rau 5761.

Fragaria vesca L. FBI. II: 344.

A herb on slopes. Flowers white 1.5 cm dia.

Khoksar, 3200 m. M. A. Rau 5850 & 6079.

Sibbaldia parviflora Willd.

= *Potentilla sibbaldii* Haller f. FBI. II: 346.

A spreading herb, common on hill slopes. Flowers yellow 0.5 cm. dia.

Rohtang Pass-Sissu, 3400-4000 m. M. A. Rau 5837, 5892 & 5948.

S. purpurea Royle.

= *Potentilla purpurea* Royle. FBI. II: 347.

Habit similar to above but flowers red.

Rohtang Pass, 4000 m. M. A. Rau 5826.

Potentilla ambigua Camb. FBI. II: 348.

A herb on rocks with yellow flowers 1-2 cms dia.

Gondla-Tandi, 3300 m. M. A. Rau 5978.

P. multifida L. FBI. II: 353.

An erect herb with pinnate leaflets cut into slender lobes and yellow flowers 1 cm dia.

Near Tandi, 3300 m. M. A. Rau 6048.

P. atrosanguinea Lodd. FBI. II: 357.

A silky haired herb with red flowers.

Near Rohtang, 4000 m. M. A. Rau 5838.

P. argyrophylla Wall. var. *leucochroa* Hook. f. FBI: II: 357.

A herb with silvery white leaflets and yellow fls.

Near Rohtang, 4000 m. M. A. Rau 6083.

Rosa macrophylla Lindl. FBI. II: 366.

A shrub with prickles and large rose-red flowers.

4-5 cms dia.

Tandi 3500 m. M. A. Rau 5946.

Pyrus malus L. FBI. II: 373.

A small tree with rose coloured flowers. Perhaps cultivated.

Near Gondla Rest House, 3300 m. M. A. Rau 5971.

Cotoneaster nummularia Fisch. & Mey. FBI. II: 386.

A rigid spreading shrub with small white flowers.

Near Sissu, 3200 m. M. A. Rau 5937.

SAXIFRAGACEAE

Saxifraga saginoides Hook. f. & Thoms. FBI. II: 392.

A curious plant, forming moss-like cushions on rocks, with small fruits.

Near Tandi, 3300 m. M. A. Rau 5990.

S. flagellaris Willd. FBI. II: 397.

A herb 12-20 cms high with leafless thread-like structures ending in anchoring buds. Flowers yellow in corymbs.

Near Rohtang, 4000 m. M. A. Rau 5822.

Bergenia stracheyi Engl.

= *Saxifraga stracheyi* Hook. f. & Thoms. FBI. II: 398.

A herb on rocks with thick oval leaves and rose colored flowers in scapes.

Near Rohtang, 4000 m. M. A. Rau 5842.

Parnassia nubicola Wall. FBI. II: 402.

A herb with thick oval basal leaves. Flowers white on long stalks.

On grassy slopes alongside streams near Sissu, 3300 m. M. A. Rau 6064.

P. ovata Ledeb. FBI. II: 403.

A herb with ovate radical leaves, long petioled and white flowers.

In moist places, Tandi, 3300 m. M. A. Rau 6041.

Ribes orientale Poir. FBI. II: 410.

A shrub on rocks. Leaves almost rotund, crenate. Flowers in racemes.

Tandi, 3300 m. M. A. Rau 6037.

CRASSULACEAE

Tillaea pentandra Royle. FBI. II: 412.

A small succulent herb with opposite leaves closely arranged on axis and small flowers in the axils.

Near Kothi, 2500 m. M. A. Rau 5799.

Sedum rhodiola DC. FBI. II: 417.

A tall herb with thick serrate opposite leaves. Infl. terminal of close cymes of reddish flowers.

Common on rocks. Tandi to Keylang, 3300 m. M. A. Rau 5998 & 6013.

S. tibeticum Hook. f. & Thoms. FBI. II: 418.

A herb with stumpy axis and white flowers.

In snow-bound rocky crevices along Rohtang Pass, 4000 m. M. A. Rau 5836.

S. tibeticum Hook. f. & Thoms. var. *stracheyi* Hook. f. & Thoms. FBI. II: 418.

A herb with purplish flowers.

In ice-breaks and rocks. Rohtang Pass, 4000 m. M. A. Rau 5825.

S. quadrifidum Pall. FBI. II: 418.

A herb with needle-shaped leaves 1 cm long. Flowers terminal, solitary, red colored. Rohtang, 4000 m. M. A. Rau 5841.

Sempervivum acuminatum Decne. FBI. II: 422.

A fleshy herb with a rosette of leaves and erect leafy branches bearing pale-purple flowers. Leaves mucronate.

In rock crevices. Khoksar-Sissu, 3300 m. M. A. Rau 5901 & 5964.

ONAGRACEAE

Epilobium roseum Schreb. FBI. II: 584.

A herb with mauve flowers.

Near water margin. Gondla, 3300 m. M. A. Rau 6063.

CUCURBITACEAE

Melothria heterophylla Cogn.

= *Zehneria umbellata* Thw. FBI. II: 625.

A climbing herb with variable leaves, lobed to deeply palmate. Flowers, male in umbel like clusters.

Near Kothi, 2500 m. M. A. Rau 5807 & 5808.

UMBELLIFERAE

Bupleurum falcatum L. FBI. II: 676.

A herb with linear acute cauline leaves and small yellow flowers. Habit shows variations.

Khoksar-Sissu, 3200 m. M. A. Rau 5899 & 5924.

B. longicaule Wall. FBI. II: 677.

An erect herb with yellow flowers.

Sissu, 3200 m. M. A. Rau 5910.

Carum carvi L. FBI. II: 680.

A cultivated herb common throughout. Flowers white.

Gondla, 3300 m. M. A. Rau 5961.

Chaerophyllum villosum Wall. FBI. II: 690.

A herb with dissected leaves and white flowers.

Khoksar, 3200 m. M. A. Rau 5848.

C. acuminatum Lindl. FBI. II: 691.

An erect herb with leaflets deeply cut and small white flowers in umbels.

Tandi, 3300 m. M. A. Rau 6026.

Seseli sp.

A large herb with dissected leaves and umbels of white flowers. Perhaps cultivated.

Gondla 3300 m. M. A. Rau 5960.

Ferula jaeschkeana Vatke. FBI. II: 708.

A large herb with trifoliate dissected leaves and prominent cauline sheaths. Inflorescence large compound umbel of yellow flowers.

Gondla, 3300 m. M. A. Rau 5959.

Heracleum thomsonii Clarke var. *glabrior* Clarke. FBI. II: 712.

A tall aromatic herb with bicompond leaves, leaflets toothed.

Gondla-Tandi, 3300 m. M. A. Rau 6015 & 6049.

H. candicans Wall. FBI. II: 714.

A tall stout herb with large compound umbels of white flowers.

Khoksar-Sissu, 3200 m. M. A. Rau 5916.

CAPRIFOLIACEAE

Lonicera obovata Royle. FBI. III: 14.

A shrub with small oblong-obovate leaves and tubular greenish-white flowers.

Rohtang, 4000 m. M. A. Rau 6090.

RUBIACEAE

Galium rotundifolium L. FBI. III: 204.

An erect herb with small ovate tri-nerved hairy leaves in whorls. Flowers small greenish.

Manali-Kothi, 2000-3000 m. M. A. Rau 5778 & 5780.

G. boreale L. FBI. III: 205.

An erect herb with linear tri-nerved leaves in whorls of 4. Flowers white.

Tandi, 3500 m. M. A. Rau 6009.

G. triflorum Michx. FBI. III: 205.

An erect herb with leaves in whorls of 6 and white flowers.

Khoksar, 3400 m. M. A. Rau 5846.

G. aparine L. FBI. III: 205.

A rambling herb with very small narrow leaves in whorls of 5-7. Fruits sticky.

Gondla, 3300 m. M. A. Rau 5966.

G. verum L. FBI. III: 208.

An erect herb with narrow needle like leaves in whorls and yellow flowers in close cymes.

Common on rocks in hills around Tandi, 3500 m. M. A. Rau 5993, 6017 & 6048.

G. asperifolium Wall. FBI. III: 207.

A sticky herb with brittle stem and small white fls.

Near hill stream, Gondla, 3500 m. M. A. Rau 5952.

VALERIANACEAE

Valeriana sp.

A very soft herb 30-40 cms high, with trifoliate leaves. Terminal leaflet largest and ovate. Petiole grooved. Flowers small white in terminal corymbs. Tandi, 3300 m. M. A. Rau 6023.

Valeriana sp.

A tall herb with opposite leaves, sessile, sheathing. Flower buds only.

Gondla, 3300 m. M. A. Rau 6060.

DIPSACACEAE

Morina coulteriana Royle. FBI. III: 216.

An erect spinescent herb with opposite leaves and yellow flowers in whorls at nodes.

Common on hill slopes between Sissu-Gondla, 3300 m. M. A. Rau 5939.

COMPOSITAE

- Erigeron andryaloides* Benth. FBI. III: 255.
A greyish woolly herb with yellowish flowers in heads, 1 cm dia.
Near Tandi, 3300 m. M. A. Rau 5985.
- E. alpinus* L. FBI. III: 255.
A herb with alternate, sessile elliptic leaves and flat heads. Disc yellowish 1 cm dia. with closely arranged narrow violet colored ray florets.
Gondla 3300 m. M. A. Rau 6054.
- E. multiradiatus* Benth. FBI. III: 256.
An erect herb 20 cms high, with cauline few-toothed leaves and single terminal heads of 2-3 cms dia.
Sissu, 3300 m. M. A. Rau 6068.
- Anaphalis nubigena* DC. var. *intermedia* Hook. f. FBI. III: 280.
A slender greyish herb with small heads.
Manali-Kothi, 2500 m. M. A. Rau 5777.
- A. cuneifolia* Hook. f. FBI. III: 280.
A softly woolly herb near streams with papery white inflorescences.
Khoksar-Tandi, 3300 m. M. A. Rau 5912, 6011 & 6031.
- Gnaphalium luteo-album* L. FBI. III: 288.
A grey woolly herb with small yellow heads.
Near Manali, 2200 m. M. A. Rau 5768.
- Achillea millefolium* L. FBI. III: 312.
An erect herb with highly dissected alternate leaves and terminal crowded heads.
Manali-Sissu, 2000-3400 m. M. A. Rau 5787, 5789 & 5918.
- Artemisia dracunculus* L. FBI. III: 321.
An erect aromatic herb with glabrous 3-forked linear leaves and greenish heads. Medicinal.
Sissu-Tandi, 3300 m. M. A. Rau 5958 & 6004.
- A. brevifolia* Wall. FBI. III: 324.
A strongly aromatic grey herb with minutely dissected leaves. Sterile.
Keylang, 3300 m. M. A. Rau 5975.
- Artemisia* sp.
A strongly scented herb. Sterile.
Near Khoksar, 3200 m. M. A. Rau 5861.
- Senecio pedunculatus* Edgew. FBI. III: 342.
A small herb with pinnately lobed leaves and small tubular heads of yellow flowers.
Gondla-Tandi, 3300 m. M. A. Rau 5977 & 6029.
- Cousinia thomsonii* Clarke. FBI. III: 360.
A stout erect spinescent herb with woolly spinescent heads.
On dry hill slopes between Khoksar & Sissu, 3200 m. M. A. Rau 5882 & 5889.
- Carduus nutans* L. FBI. III: 361.
An erect herb 40-60 cms high with fascicled heads.
Keylang, 3300 m. M. A. Rau 5999.

Cnicus involucratus DC. FBI. III: 362.

A tall stout spinescent herb.
Gondla, 3300 m. M. A. Rau 6057.

Saussurea lappa Clarke. FBI. III: 376.

A tall herb with triangular lobed leaves and hard bristled heads.
Near Sissu, perhaps cultivated, 3200 m. The 'Kuth' of commerce. M. A. Rau 5919.

Crepis multicaulis Ledeb. sub sp. *congesta* (Rgl.) Bab.

An erect herb with all radical lyrate leaves 5-6 cms long. Flowering stem 20 cms, leaflets, corymbosely branched above, heads 1 cm, flowers reddish.
Khoksar, 3200 m. M. A. Rau 5876.

Taraxacum officinale Wigg. FBI. III: 401.

A herb with large yellow heads.
Khoksar-Sissu, 3300 m. M. A. Rau 5860 & 5880.

Lactuca dissecta D. Don. FBI. III: 405.

A herb with radical lyrate leaves; stem leaves linear lanceolate, sessile winged at base. Heads white to violet blue 1 cm dia.
Kothi-Tandi, 2500-3500 m. M. A. Rau 5771, 5772 & 6006.

Sonchus oleraceus L. FBI. III: 414.

An erect herb 40 cms high with sharp toothed leaves, purplish tinged. Heads crowded at apex. Achene flattened, oval, ribbed.
Kothi, 2500 m. M. A. Rau 5791.

Tragopogon gracile D. Don. FBI. III: 417.

A milky-juiced erect herb with grass-like leaves and tubular heads of yellow flowers.
Gondla-Sissu, Common on hill slopes and in fields, 3200 m. M. A. Rau 6059.

Scorzonera divaricata Turcz. FBI. III: 418.

An erect herb with numerous slender curved leaves and cylindric heads.
Sissu-Tandi, 3300 m. M. A. Rau 5925 & 5982.

CAMPANULACEAE

Codonopsis ovata Benth. FBI. III: 433.

A tall herb up to a metre in height with ovate leaves. Flowers large, mauve coloured, drooping, nearly 3 cms. long and 2 cms wide, bell-shaped.
In fields near Tandi, 3300 m. M. A. Rau 6020.

Campanula colorata Wall. FBI. III: 440.

An erect hairy herb 15-20 cms with alternate ovate dentate leaves and bluish flowers.
Gondla, 3300 m. M. A. Rau 5967.

C. argyrotricha Wall. FBI. III: 441.

A herb on rocks with cream white flowers.
Keylang, 3300 m. M. A. Rau 5997.

C. aristata Wall. FBI. III: 441.

A slender herb with narrow linear grass-like leaves and solitary bluish flowers. Calyx lobes filiform projecting beyond petals.
On way to Khoksar, 3600 m. M. A. Rau 5847.

ERICACEAE

- Gaultheria trichophylla* Royle. FBI. III: 457.
A much branched wiry stemmed plant with small bell-shaped reddish flowers.
Rohtang Pass, 4500 m. M. A. Rau 5829.
- Cassiope fastigiata* D. Don. FBI. III: 459.
A fastigiate herb with bell-shaped flowers. calyx reddish, corolla white.
Rohtang Pass, 4000 m. M. A. Rau 5828 & 6096.
- Rhododendron lepidotum* Wall. FBI. III:
A stunted shrub with glandular leaves and purplish blue flowers 2 cms dia.
Near Rohtang, 4000 m. M. A. Rau 6102.

PRIMULACEAE

- Primula denticulata* Smith. FBI. III: 485.
A herb with thick sessile leaves and purple flowers in heads.
Near Khoksar, 3600 m. M. A. Rau 5858.
- P. involucrata* Wall. FBI. III: 488.
A herb with radical spoon-shaped leaves and white flowers on long scape.
Rohtang Pass, 4000 m. M. A. Rau 5821.
- P. rosea* Royle FBI. III: 488.
A herb on grassy slopes and near melting snow with rose-red flowers 1.5 cm dia.
Rohtang Pass, 4000 m. M. A. Rau 5819.
- P. macrophylla* D. Don. sub. sp. *moorcroftiana* (FBI. III: 490 under *P. stuartii* Wall.).
A herb with linear leaves, silvery white underneath and sky-blue flowers 1-1.5 cm dia.
Near Rohtang, 4000 m. M. A. Rau 5818.
- P. minutissima* Jacq. FBI. III: 494.
A very small herb with toothed leaves and violet-purple flowers about 1 cm dia.
Rohtang Pass, 4000 m. M. A. Rau 5835.
- Androsace rotundifolia* Hardw. FBI. III: 496.
A herb with orange centred white flowers 1 cm dia.
Near Gondla, 3300 m. M. A. Rau 5969.
- A. sempervivoides* Jacq. FBI. III: 497.
A herb with leaves in rosettes. Flowers rose-red.
Rohtang Pass, 4000 m. M. A. Rau 5824.
- Cortusa matthioli* L. FBI. III: 501.
A herb with rotund basal leaves and purple flowers on long scape.
In a rock crevice near dripping water.
Tandi, 3300 m. M. A. Rau 6018.

ASCLEPIADACEAE

- Cynanchum vincetoxicum* Pers. FBI. IV: 22.
An erect herb with sessile opposite leaves and yellow flowers.
Near Kothi, 2800 m. M. A. Rau 5806.

GENTIANACEAE

- Gentiana tenella* Fries. FBI. IV: 109.
A herb on moist hill slopes with tubular violet-blue flowers.
Gondla, 3300 m. M. A. Rau 5965 & 6065.

- G. argentea* Royle. FBI. IV: 112.
A small herb with silvery margined leaves and blue flowers.
Khoksar-Sissu, 3300 m. M. A. Rau 5909.
- G. detonsa* Fries. FBI. IV: 118.
An erect herb with tubular flowers, corolla tube nearly 4 cms. long, violet blue.
Tandi, 3300 m. M. A. Rau 6024.
- Jaeschkea gentianoides* Kurz. FBI. III: 119.
A herb with blue flowers.
Near water margins on hill slopes. Sissu 3200 m. M. A. Rau 6062 & 6077.

BORAGINACEAE

- Cynoglossum denticulatum* A. DC. FBI. IV: 157.
An erect hairy herb with blue flowers.
Sissu-Gondla, 3300 m. M. A. Rau 5956.
- C. wallichii* Don. FBI. IV: 157.
A large hairy herb with blue flowers.
Khoksar-Sissu, 3200 m. M. A. Rau 5866-5928.
- Cynoglossum* sp.
Specimens too young for exact determination.
Kothi, 2500 m. M. A. Rau 5763.
- Adelocaryum anchusoides* (Lindl.) Brandis.
= *Paracaryum heliocarpum* A. Kem. FBI. IV: 161.
A hairy herb with spatulate radical leaves and bluish flowers in drooping racemes. Corolla turns purplish often; very common throughout.
Khoksar-Sissu, 3200 m. M. A. Rau 5875, 5940 & 6061.
- Hackelia glochidiata* (Wall.) Brandis.
= *Paracaryum glochidiatum* Benth. FBI. III: 161.
A herb with cordate ovate long petioled leaves and blue flowers.
Near Rohtang, 4000 m. M. A. Rau 6103.
- Echinosperrum barbatum* Lehm. FBI. IV: 163.
A spreading herb with small leaves 1 cm long, and pale violet-blue flowers.
Sissu-Gondla, 3300 m. M. A. Rau 5933.
- Eritrichium strictum* Decne. FBI. IV: 164.
A perennial herb with numerous erect branches, narrow linear leaves and sky-blue flowers.
Tandi, 3500 m. M. A. Rau 6014.
- Asperugo procumbens* L. FBI. IV: 167.
A sticky spreading herb with 4-angled brittle stem, small blue flowers and lobed fruits.
Sissu-Gondla, 3300 m. M. A. Rau 5953.
- Mertensia echioides* Benth. FBI. IV: 170.
An erect herb with spatulate long-petioled basal-leaves and blue flowers with exserted anthers.
On rocks near Tandhi, 3300 m. M. A. Rau 6012.
- Myosotis sylvatica* Hoffm. FBI. IV: 173.
A hispid small herb with yellow centred blue fls.
Near Rohtang, 4000 m. M. A. Rau 5831.
- M. stricta* Link. FBI. IV: 174.
A small herb 10-16 cms high with narrow linear leaves and very small blue flowers.
Sissu, 3400 m. M. A. Rau 5930.

Macrotomia benthamii DC. FBI. IV: 177.

A rough hairy herb with blue flowers in dense hairy inflorescences. Roots purplish inside and medicinal (BALSAD).

Gondla, 3500 m. M. A. Rau 6051.

Onosma hispida Wall.

= *O. echioides* L. FBI. IV: 178.

A profusely hispid grey herb with white tubular fls. On dry slopes. Sissu, 3400 m. M. A. Rau 5898.

CONVOLVULACEAE

Convolvulus arvensis L. FBI. IV: 219.

A twiner with ovate-cordate leaves and pale purple tubular flowers.

Tandi, 3300 m. M. A. Rau 6008.

SOLANACEAE

Physochlaina praelta Hook. f. FBI. IV: 244.

A herb with greenish tubular flowers, stamens exerted. Medicinal.

On a dry hill slope near Tandhi, gregarious, 3500 m. M. A. Rau 5992.

Hyoscyamus niger L. FBI. IV: 244.

An erect herb with lobed leaves and purple veined tubular flowers. Medicinal.

Khoksar, 3200 m. M. A. Rau 5874.

SCROPHULARIACEAE

Verbascum thapsus L. FBI. IV: 250.

An erect woolly herb with yellow flowers in cylindrical spikes. Common throughout.

Khoksar, 3200 m. M. A. Rau 6075.

Scrophularia calycina Benth. FBI. IV: 253.

An erect herb with ovate serrate opposite leaves and dense terminal cymes.

Near Rohtang, 4000 m. M. A. Rau 5827.

S. polyantha Royle. FBI. IV: 255.

A herb with ovate coarse leaves and greenish flowers and fruits in large spreading panicles.

Near Kothi, 2500 m. M. A. Rau 5792.

S. scabiasaefolia Benth. FBI. IV: 256.

A herb on rocks and dry hill slopes with lobed serrate leaves and rose-white flowers.

Khoksar-Sissu, 3200 m. M. A. Rau 5888 & 5943.

Wulfenia amherstiana Benth. FBI. IV: 291.

A herb with obovate crenate radical leaves and blue flowers in radical scapes.

Kothi-Rahla, 2800 m. M. A. Rau 5776 & 6106.

Veronica deltigera Wall. FBI. III: 292.

A blue flowered herb with opposite leaves.

Near a stream. Gondla, 3300 m. M. A. Rau 5972.

V. biloba L. FBI. IV: 294.

A small glabrous herb with small blue flowers.

Khoksar-Sissu, 3200 m. M. A. Rau 5902 & 6035.

Euphrasia officinalis L. FBI. IV: 305.

A small herb with opposite leaves and dull white flowers in racemes.

Near Sissu, 3200 m. M. A. Rau 5920.

Pedicularis pectinata Wall. FBI. IV: 306.

A tall herb with dissected leaves in whorls of 4 and purplish flowers in close bracteate spikes.

Tandi, 3300 m. M. A. Rau 6021.

P. siphonantha D. Don. FBI. IV: 313.

A herb near streams and on moist slopes with rose-pink flowers.

Sissu, 3200 m. M. A. Rau 5955.

P. rhinanthoides Schr. FBI. IV: 314.

A herb with violet flowers.

Rohtang Pass, 4000 m. M. A. Rau 6086.

P. versicolor Wahlb. FBI. IV: 316.

A herb of alpine slopes with yellow flowers.

Rohtang Pass, 4000 m. M. A. Rau 5823.

OROBANCHACEAE

Orobanche epithymum DC. FBI. IV: 325.

A herb with orange brown to purplish flowers parasitic on *Thymus serpyllum* and *Artemisia* sp.

Gondla-Keylang, 3300 m. M. A. Rau 5986 & 6052.

ACANTHACEAE

Strobilanthes alatus Nees. FBI. IV: 464.

A tall herb with leaves 10-16 cms, serrate acuminate and blue flowers.

Kothi, 2800 m. M. A. Rau 5784.

SELAGINEAE

Lagotis glauca Gaertn. FBI. IV: 559.

A herb with thick radical oblong crenate leaves. Flowers blue in dense spikes.

Gregarious on alpine slopes along Rohtang Pass, 4000 m. M. A. Rau 5820 & 6084.

LABIATAE

Thymus serpyllum L. FBI. IV: 649.

A prostrate spreading aromatic herb with purple fls. Common on hill slopes throughout.

Kothi-Keylang, 2 to 4000 m. M. A. Rau 5795 & 5879.

Calamintha clinopodium Benth. FBI. IV: 650.

An erect herb with flowers in whorls.

Gondla, 3300 m. M. A. Rau 6067.

Nepeta linearis Royle. FBI. IV: 657.

An erect herb 15-40 cms high, with linear cauline leaves and mauve-pink flowers in terminal whorls.

Sissu-Tandi, 3300 m. M. A. Rau 5957 & 6027.

N. eriostachya Benth. FBI. IV: 657.

An erect herb with opposite obtuse ovate crenate leaves and bluish flowers.

Khoksar-Sissu, 3200 m. M. A. Rau 5895.

Prunella vulgaris L. FBI. IV: 670.

An erect herb with purple flowers in dense whorls. Kothi-Gondla, 2500-3500 m. M. A. Rau 5766, 5793, 5804 & 6066.

Phlomis bracteosa Royle. FBI. IV: 693.

An erect herb with thick ovate hairy leaves and whorls of purple flowers common on hill slopes throughout.

Khoksar-Gondla, 3300 m. M. A. Rau 5851, 5914 & 5938.

PLANTAGINACEAE

Plantago major L. FBI. IV: 705.

A large herb with spike 20 cms long.

Tandi, 3500 m. M. A. Rau 6033.

P. brachyphylla Edgew. FBI. IV: 706.

A small prostrate herb with erect spikes 8 to 10 cms. Common throughout.

Rohtang-Khoksar, 4000 m. M. A. Rau 5812 & 5852.

CHENOPODIACEAE

Chenopodium blitum Hook. f. FBI. VI: 5.

A large herb with triangular leaves and small greenish flowers in axillary clusters.

Sissu-Gondla, 3200 m. M. A. Rau 5947.

POLYGONACEAE

Polygonum paronychioides C. A. Mey. FBI. V: 26.

A herb on rocks with white stem and small reddish flowers.

Sissu, 3200 m. M. A. Rau 5942.

P. aviculare L. FBI. V: 26.

An erect herb with alternate leaves, membranous stipules and small red flowers in axils.

Kothi-Tandi, 2500-3500 m. M. A. Rau 5796 & 6007.

P. viviparum L. FBI. V: 31.

A pinkish-white flowered herb of water margins. Khoksar-Sissu, 3400 m. M. A. Rau 5908.

P. amplexicaule D. Don. FBI. V: 32.

An erect herb with amplexicaul leaves and purple-flowered spikes.

Rahla, 3000 m. M. A. Rau 6108.

P. affine D. Don. FBI. V: 33.

A tufted herb with rose-colored flowers in close spikes. Common along water margins.

Rohtang, 4000 m. M. A. Rau 5839.

P. amphibium L. FBI. V: 34.

A floating herb with stout racemes of dull red flowers.

Forms large mats in lake near Sissu, 3200 m. M. A. Rau 6071.

P. alpinum All. FBI. V: 49.

A tall herb with linear-lanceolate leaves and profusely branched large panicles of white flowers.

Gondla, Tandi, 3300 m. M. A. Rau 6032.

Rheum webbianum Royle. FBI. V: 57.

A large herb perched on precipitous rock edges. Flowers white and flattened reddish fruits.

Khoksar-Tandi, 3300 m. M. A. Rau 6042.

Oxyria digyna Hill. FBI. V: 58.

An erect soft herb with radical cordate-reniform leaves and panicles of white flowers.

Khoksar, 3200 m. M. A. Rau 5844.

THYMELAEACEAE

Wickstroemia canescens Meissn. FBI. V: 195.

A shrub with cymose clusters of yellow tubular flowers.

Kothi-Rahla, 2500-3000 m. M. A. Rau 5798 & 6107.

URTICACEAE

Urtica dioica L. FBI. V: 548.

A common nettle.

Sissu, 3200 m. M. A. Rau 5950.

CUPULIFERAE

Alnus nitida Endl. FBI. V: 600.

A tree with short pendulous spikes.

Near Manali, 2200 m. M. A. Rau 5774.

SALICACEAE

Salix oxycarpa Anders. FBI. V: 636.

A tree in cultivation in Lahul valley.

Sissu, 3200 m. M. A. Rau 5931.

Populus ciliata Wall. FBI. V: 638.

A tree in cultivation.

Sissu-Gondla, 3500 m. M. A. Rau 5973.

GYMNOSPERMS-GNETACEAE

Ephedra gerardiana Wall. FBI. V: 640.

A rigid shrub with male flowers. On a rock edge near Tandi, 3500 m. M. A. Rau 5995.

CONIFERAE

Juniperus communis L. FBI. V: 646.

A stunted shrub with cones. On rocks.

Tandi Hill, 3500 m. M. A. Rau 6038.

J. wallichiana Hook. f. FBI. V: 646.

A medium sized tree near Gondla village, 3500 m. M. A. Rau 6056.

MONOCOTYLEDONS

ORCHIDACEAE

Orchis latifolia L. FBI. VI: 127.

A ground orchid with purple flowers.

Common on hill slopes.

Sissu-Tandi, 3300 m. M. A. Rau 5915 & 6022.

SCITAMINEAE

Roscoea procera Smith.

A herb with purple-flowers.

Near Rahla, 2700 m. M. A. Rau 6105.

IRIDACEAE

Iris kumaonensis Wall. FBI. VI: 274.

An Iris with fruit.

Near Khoksar, 3200 m. M. A. Rau 5856.

Belamcanda chinensis Leman. FBI. VI: 277.

A herb with strap-shaped leaves and obovoid capsules. Perhaps cultivated.

Kothi, 2500 m. M. A. Rau 5762 & 5781.

LILIACEAE

- Eremurus himalaicus* Baker. FBI. VI: 332.
A characteristic plant of the hill slopes between Gondla and Tandi, 3500 m. Large pyramidal racemes of white flowers. M. A. Rau 5988.
- Allium rubellum* Bieb. FBI. VI: 339.
A pretty herb on rocks with blue flowers in umbels. Tandi, 3500 m. M. A. Rau 6010.
- A. blandum* Wall. FBI. VI: 339.
A foetid-smelling large herb with globose heads of pinkish flowers.
On a precipitous rock edge near Tandi, 3500 m. M. A. Rau 6043.
- A. victorialis* L. FBI. VI: 342.
A bulbous herb with white flowers in heads. Rohtang Pass, 4000 m. M. A. Rau 6091.
- Lloydia serotina* Reichb. FBI. VI: 354.
An erect herb with white flowers, yellow veins on corolla lobes.
Near Rohtang, 4000 m. M. A. Rau 6101.
- Gagea lutea* Sch. FBI. VI: 355.
A small herb with yellow flowers.
Khoksar, 3200 m. M. A. Rau 5865.

JUNCACEAE

- Juncus lampocarpus* Ehr. FBI. VI: 395.
In moist situations near Manali, 2300 m. M. A. Rau 5767.
- Juncus* sp.
Khoksar-Sissu, 3200 m. M. A. Rau 5906 & 5935.

AROIDEAE

- Arisaema jacquemontii* Blume. FBI. VI: 505.
Near Rahla, 2700 m. M. A. Rau 6098.

NAIDACEAE

- Triglochin palustre* L. FBI. VI: 563.
A scapigerous herb in moist situations. Leaves linear narrow, flowers racemose on long scape.
Tandi, 3500 m. M. A. Rau 5922.

CYPERACEAE

- Eriophorum microstachyum* Boeck. FBI. VI: 664.
A slender herb with narrow leaves and brownish spikes.
In rock crevices. Kothi, 2600 m. M. A. Rau 5800 m.
- Kobresia royleana* Boeck. FBI. VI: 698.
A stout herb with purplish spikes.
Near Rohtang, 4000 m. M. A. Rau 6099.
- Carex orbicularis* Boott.
= *C. rigida* Gooden. FBI. VI: 771.
Spikes brownish. Sissu, 3200 m. M. A. Rau 5923.
- C. alpina* Sw. FBI. VI: 730.
Near Sissu, 3400 m. M. A. Rau 5926.

GRAMINEAE

- Chrysopogon gryllus* (L.) Trin.
= *Andropogon gryllus* L. FBI. VII: 188.
A grass forming dense tufts.
Kothi, 2800 m. M. A. Rau 5809.
- Phleum alpinum* L. FBI. VII: 236.
Near Sissu village, 3200 m. M. A. Rau 5911.
- Alopecurus arundinaceus* Poir. FBI. VII: 238.
Near Sissu, 3200 m. M. A. Rau 5927.
- Koeleria cristata* Pers. FBI. VII: 308.
A densely tufted grass with shining spikelets.
Growing along with *Ephedra* on a rock edge.
Sissu-Tandi, 3200 m. M. A. Rau 5949 & 6040.
- Eremopoa persica* (Trin.) Roshev.
= *Poa persica* Trin. FBI. VII: 337.
Khoksar-Sissu, 3200 m. M. A. Rau 5903 & 6074.
- Poa bulbosa* L. FBI. VII: 338.
Near Gondla, 3300 m. M. A. Rau 5962, 5963 & 6055.
- P. alpina* L. FBI. VII: 338.
Khoksar, 3200 m. M. A. Rau 5854.

FIG. 1. *Morina coulteriana* Royle.

- P. bactriana* Rosh.
Tandi hill, 3800 m. M. A. Rau 6034.
- Bromus asper* Murray. FBI. VII: 358.
A tall grass with large panicles of spreading branches.
Near Tandi, 3500 m. M. A. Rau 5983.
- Hordeum vulgare* L. FBI. VII: 371.
Cultivated in fields along Chandra Bhaga river.
Tandi, 3500 m. M. A. Rau 6005.

PTERIDOPHYTA

SELAGINELLACEAE

Selaginella sp.

Tandi, 3500 m. M. A. Rau 6045.

EQUISETACEAE

Equisetum arvense L.

In moist situations.

On way to Khoksar, 3700 m. M. A. Rau 5843.

FILICALES

Osmunda claytoniana L.

With sori. Common near Kothi, 2800 m. M. A. Rau 5813.

Onychium multisectum F. Henderson.

Very common all along the route, Manali to Kothi, 2000-2800 m. M. A. Rau 5779.

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