

## PLANT COLLECTION WITH THE KEDARNATH PARBAT EXPEDITION 1967

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## ABSTRACT

The paper gives an account of the collection of plants made by the author who was a botanist member of the Kedarnath Parbat Expedition organised by the Gangotri Exploration Committee, Calcutta in Sept.-Oct., 1967. The area under study lies between 30°80'-31°25'N and 78°60'-79°45'E and includes the Bhagirathi valley, Gangotri glacier, Tapovan, Sivalinga Base, and the glacier regions around the Kedarnath Dome, covering an altitude range of 1500 m to 5500 m. During the stay with the expedition nearly 1375 specimens comprising 187 species of flowering plants, 6 species of Gymnosperms and 8 species of Pteridophytes were collected. Notes on the places of special interest are also incorporated in brief in the paper.

## INTRODUCTION

The Gangotri Exploration Committee, an association of enthusiastic young mountaineers from Calcutta, organised a mountaineering-cum-scientific expedition in the autumn of 1967, to explore the glacial environs of the Kedarnath Peak (6,880 m) and also attempt the ascent of the Peak itself. At the request of Shri Amulya Sen, the leader of the expedition, the Director, Botanical Survey of India deputed Shri B. D. Naithani of the Northern Circle, Botanical Survey of India, to accompany the expedition as a Botanist. Shri Naithani was assisted in the field by Shri R. S. Karki, Shri Surendra Singh and Shri Shyam Singh, all members of staff of the Northern Circle, Dehra Dun.

The Botanist members studied the flora along the trekking route from Uttarkashi and also at higher altitudes, in the glacial zone, upto an altitude of 5500 m. The following areas were, in particular, given special attention for the collection of plants. Gangotri glacier, Tapovan, Sivalinga Base and the glaciers around the Kedarnath Dome. A total number of 1375 specimens were collected which on further study yielded 201 species of flowering plants and ferns.

The area visited lies in one of the most attractive of all sectors of the Himalaya and includes many places of great religious significance to the Hindus. The river Bhagirathi, the main component of Ganga, considered the holiest of all holy rivers takes its origin from the glacial zone beyond Gangotri and in its downward course is joined by a number of tributaries among which are the Kedar Ganga, the Jat-Ganga (Janhavi), Ksheer Ganga, Hari Ganga, Varuna and Assi, before it confluent with the Alaknanda at Dev Prayag. The famed Peaks of

Kedarnath, Sivalinga and Srikantha, all associated with the name of Siva are considered sacred in this region.

## ITINERARY

Botanical collections were made on the way from Bhatwari to Gangotri and beyond. Bhatwari is situated at an altitude of 1500 m. On the way to Bhatwari from Uttarkashi *Erythrina* sp. was in beautiful red flowers. Trees like *Rhododendron arboreum*, species of *Celtis* and *Cedrela* were also seen along the road side. *Cannabis sativa*, *Nican-dara physaloides*, *Cyathula tomentosa*, *Debre-geasia* sp., and *Girardinia* sp., were commonly seen throughout. All the way on either side of the road *Erianthus* sp., was very common whereas *Eriophorum* sp., was found growing on moist rocky places. Near Gangnani, situated at an altitude of 1800 m, *Alnus nitida*, *Prinsepia utilis*, *Sarcococca pruniformis*, *Sorbaria tomentosa*, etc., were found growing in and around the hot springs known as Rishi Kunds. On the way to Harsil, which is a beautiful place located at an altitude of 2500 m. the road passes through a rich forest of *Cedrus deodara* and *Pinus wallichiana*, in which are also found some trees of *Aesculus indica*. Shrubs like *Hippophae salicifolia* and *Sorbaria tomentosa* were found growing along with the herbs like *Carduus nutans*, *Solidago virga-aurea*, *Verbascum thapsus*, *Cyathula tomentosa* and others; besides, there were climbers like *Clematis buchananiana*, *Oxybaphus himalaicus*, *Vicia pallida*, *Polygonum pterocarpum*. On the way to Harsil there is a small village by name Sukkhi situated at an altitude of 2653 m, where apple cultivation is seen. Harsil is situated at the confluence of Hariganga

and Bhagirathi and in and around the locality trees like *Pinus wallichiana*, and *Cedrus deodara* were very common where as shrubs like *Hippophae salicifolia* and *Sorbaria tomentosa* were found growing on either side of the banks or near the sandy depositions. Among the herbs, *Plantago asiatica*, *Swertia cordata*, *Ranunculus laetus*, *Prunella vulgaris*, *Datisca cannabina*, *Ainsliaea pteropoda* and others were found either near the water margins or as an undergrowth in the *Pinus-Cedrus* forest.

From Harsil onwards the way is through the *Cedrus* and *Pinus* forest along the Bhagirathi river. There were also few trees of *Aesculus indica* and *Acer caudatum*. Intermixed with these trees of *Juglans regia* in fruits were found growing in some places on the way.

Further north along the route to Gangotri, Janhavi (Jat-Ganga) flowing down from Nilang side ultimately confluences with the Bhagirathi. The Bhaironghati is situated amidst *Cedrus deodara* and *Pinus wallichiana* forest, while on way to Bhaironghati, species of *Viola* and *Plectranthus rugosus* were found growing very commonly on the rocks. The route from Bhaironghati to Gangotri is very good with a gradual ascent and the roaring sound of the river flowing down the gorge creates an enthralling atmosphere. Among the dominant trees, *Pinus wallichiana* and *Cedrus deodara* were found forming the major components of the forest throughout on the way and shrubs like *Lonicera quinquelocularis*, *Viburnum cotinifolium*, *Rosa sericea* were found growing along with the common herbs like *Senecio chrysanthemoides*, *Senecio pedunculata*, *Carduus nutans*, *Solanum nigrum*, *Anaphalis margaritacea*, *Lactuca longifolia*, *Inula grandiflora*, *Impatiens edgeworthii*, *Saussurea albescens*, *Leonurus cardiaca* and others. *Dioscorea deltoidea* was in fruits but this plant is not common here.

The holy shrine of Gangotri is situated at an altitude of 3250 m. in a beautiful valley at the confluence of Kedar Ganga and Bhagirathi where the river Bhagirathi takes its turn towards north (Uttaravahini). Botanical explorations in the Gangotri, Kedar Ganga and Rudragaira regions were conducted. *Pinus wallichiana* and *Cedrus deodara* are very common here with *Acer caudatum*, *Betula utilis*, *Taxus baccata*, *Syringa emodi*, *Picea morinda*, *Prunus cornuta* intermixed with them. The forest of those localities is thickly populated with *Viburnum cotinifolium*, *Rosa sericea*, *Ribes grossularia*,

*Cotoneaster* sp., *Juniperus communis*, *Spiraea vestita* and *Abelia triflora*, etc. whereas the forest undergrowth was occupied by herbs like *Thalictrum reniforme*, *T. pauciflorum*, *Silene venosa*, *Astragalus cashmirensis*, *Senecio pedunculata*, *Salvia nubicola*, *Thermopsis barbata*, *Saussurea albescens*, *Leonurus cardiaca*. In some places around, *Betula utilis*, the saprophyte *Hypopithys lanuginosa* and the ground orchid, *Goodyera repens* were found growing. *Podophyllum emodi* and *Actaea spicata* were only occasionally seen. Species of *Polypodium* and *Adiantum* were very common in shady places.

On the way to Gaumukh the narrow path goes through a beautiful place called CHIRBASHA (abode of blue pine). In this area there are mostly stunted trees of *Pinus wallichiana* along with some trees of *Betula utilis*. *Rheum webbianum*, a tall fleshy herb, along with a number of other herbs like *Campanula colorata*, *Bergenia ciliata*, *Heracleum candicans*, *Anaphalis cuneifolia*, *Sedum ewersii* and others. Beyond Chirbasha towards Gaumukh there is another beautiful place situated at the confluence of Baitarni and Bhagirathi, the BHOJBASHA (the abode of *Betula utilis*). There is a gradual disappearance of *Pinus wallichiana* and it almost completely disappears in Bhojbasha. The route follows along the rocks as a narrow tract. Thick growth of *Juniperus communis* and *Rhododendron anthopogon* along with some herbs like *Heracleum candicans*, *Morina longifolia*, *Anaphalis cuneifolia*, *Sedum ewersii* and *Saussurea roylei* are seen towards Bhojbasha.

Gaumukh which is situated at an altitude of 3,900 m, is visible from a short distance beyond Bhojbasha. Approaching Gaumukh, there are trees of *Betula utilis* along with few trees of *Sorbus foliolosa* and a thick growth of the woody shrubs. *Juniperus* and *Rhododendron* associated with *Cotoneaster garhwalensis* are found on the rocky places. Herbs like species of *Heracleum*, *Polygonum*, *Oxyria*, *Anaphalis*, *Morina* and *Erysimum* and alpine grasses are very common throughout. The route passes through the wide boulder spread basin which occupies a considerable area and terminates in Gaumukh proper. a vast glacier having the snout and the ice cave. From here, the Bhagirathi emerges and flows down towards Gangotri. The area in and around Gaumukh is more or less vegetated with *Ephedra gerardiana* and *Hippophae rhamnoides*, *Astragalus cashmirensis*, *Polygonum tortuosum*, *Anaphalis cuneifolia*, while in rocky places, a thick

growth of *Juniperus* and *Rhododendron* is found with the association of *Cassiope festigiata* and *Cotoneaster garhwalensis*.

North-west of Gaumukh, Tapovan is situated at an altitude of 4700 m. The journey is rather perilous as the route is through the glacier interspread with large crevices and there is always the risk of losing a foot hold or of getting caught under falling boulders. Beyond the glacier, the ground is strewn with big boulders along with loose sand. Tapovan is an open meadow, thickly populated with *Aconitum violaceum*, *Potentilla gelida*, *Euphrasia* sp., *Pleurogyne carinthiaca*, *Juncus himalaica*, *Primula minutissima* and the meadow is always kept well drained by the torrents flowing through them. On the way to the Base Camp an interesting *Leontopodium* was collected near the water margin.

The view of the great Sivalinga is quite clear from a point 3 km ahead of the meadow. The Sivalinga is a tall straight rock having a broad base and a narrow peak thus forming a huge pyramid in outline. It is always snow covered. On the foreground of Sivalinga, the base camp was established at an altitude of 4725 m. The beautiful view of Bhagirathi mountain, the Nandanban, the Chatrungi glacier, the Raktavarna glacier as also the twin Mana can be seen standing on either side of Sivalinga. *Saussurea obvallata*, *Lactuca lessertiana*, *Rhododendron* sp., *Meconopsis aculeata*, *Pleurospermum candollii*, *Cremanthodium decaisnei* are found growing on way to Sivalinga on the rocky slopes, where as near the snow line *Waldheimia glabra*, *Saussurea sacra* and *saxifraga jacquemontiana* are very common.

After having made collections in these localities the botanical exploration work was conducted in the Kedarnath Dome area, which is situated beside the Kharchakunda in front of the Kirthibhamak glacier. The Dome itself is a huge convex mass of hard snow and presents extraordinary beautiful appearance. On the way to Kirthibhamak, *Poa bulbosa*, *Festuca valesiaca*, *Potentilla inglisii*, *Leontopodium alpinum*, *Anaphalis* sp., *Artemisia moorcroftiana*, *A. roxburghiana* var. *purpurascens*, *Gentiana stipitata* and *Polygonum affine*, etc., were collected on rocks or in rocky crevices.

From the base camp to Kirthibhamak glacier, the area was very dry and only in some places which were somewhat wet due to the melting of snow, some of the herbs like *Potentilla macrophylla*, *Gentiana tubiflora*, *Avena subspicata*, *Festuca valesiaca*,

*Kobresia nitens*, *Carex nivale*, *Gentiana venusta*, *Holosteum umbellatum* were found. *Saussurea sacra* was, however, found growing near the snow line under almost dry conditions.

#### ENUMERATION

*Note:* The collector's name for the field numbers cited in the enumeration is *Naithani*.

#### ANGIOSPERMS

#### DICOTYLEDONS

#### RANUNCULACEAE

##### *Aconitum violaceum* Jacq.

Common in moist places, flowering, Tapovan, 4200-4700 m, 37411, Sept. 1967.

##### *Actaea spicata* Linn.

Rare, fruiting, Gangotri-Kedarganga, 3246-3300 m, 37515, Oct. 1967.

##### *Delphinium brunonianum* Royle

Rare, flowering, around base camp, 4725 m, 37471, Sept. 1967.

##### *Ranunculus diffusus* DC.

Common near water, flowering, Harsil, 2560 m, 37532, Oct. 1967.

##### *Thalictrum pauciflorum* Royle

Common, fruiting, Gangotri-Kedarganga, 3246 m, 37380, Sept. 1967.

##### *T. reniforme* Wall.

Common, flowering and fruiting, Gangotri-Kedarganga, 3246 m, 37388, Sept. 1967.

#### BERBERIDACEAE

##### *Berberis pachyacantha* Koehne

Rare in *Betula* forest, fruiting, Gangotri-Kedarganga, 3246 m, 37387, Sept. 1967.

#### PAPAVERACEAE

##### *Meconopsis aculeata* Royle

Common, fruiting around base camp, 4725 m, 37473, Sept. 1967.

#### FUMARIACEAE

##### *Corydalis ramosa* Wall. ex H. f. & Th.

Common, flowering and fruiting, Gangotri, 3246 m, 37512, Oct. 1967.

##### *Corydalis* sp.

Common, flowering, Tapovan, 4200-4700 m, 37513, Sept. 1967.

#### BRASSICACEAE (CRUCIFERAE)

##### *Arabidopsis himalaica* (Edgew.) O. E. Sch.

Common, flowering and fruiting, Gaumukh-Pushpavasha, 4200 m, 37435, Sept. 1967.

**Erysimum hieracifolium** Linn.

Common, flowering, Harsil-Bhojbasha, 2560-3300 m, 37307 and 37494, Sept.-Oct. 1967.

## CARYOPHYLLACEAE

**Arenaria festucoides** Benth.

Common, flowering and fruiting, on way to Puspavasha, 4200 m, 37432, Sept. 1967.

**A. glanduligera** Edgew.

Common, flowering, base camp and Kirtibhamak glacier, 37470, 37483, 4725-5400 m, Sept.-Oct. 1967.

**A. serpyllifolia** Linn.

Common, flowering, Harsil, 2560 m, 37317, Sept. 1967.

**Cucubalus bacciferus** Linn.

Rare, fruiting, Harsil, 2560 m, 37324, Sept. 1967.

**Holosteum umbellatum** Linn.

Common, flowering, base camp-Kirtibhamak glacier, 4725-5300 m, 37419, 37479, Sept.-Oct. 1967.

**Lychnis brachypetala** Hort.

Common, fruiting, way to Puspavasha, 4200 m, 37434, Sept. 1967.

**L. pilosa** Edgew.

Common, flowering, Gangotri, 3246 m, 37353, Sept. 1967.

**Sagina saginoides** (Linn.) Karstern

Common, flowering, Harsil, 2560 m, 37530, Oct. 1967.

**Silene cucubalus** Wibel

Common, fruiting, Gangotri, 3246 m, 37389, Sept. 1967.

**Stellaria decumbens** Edgew.

Common, fruiting, Tapovan, 4200-4700 m, 37422, Sept. 1967.

## BALSAMINACEAE

**Impatiens brachycentra** Kar. & Kir.

Common in *Cedrus* forest, flowering and fruiting, Harsil, 2560 m, 37330, Sept. 1967.

**I. gigantea** Edgew.

Common, fruiting, Gangotri, 3246 m, 37521, Oct. 1967.

## CELASTRACEAE

**Euonymus fimbriatus** Wall.

Common, fruiting, Gangotri-Rudragaira, 3246 m, 37362, Sept. 1967.

## SAPINDACEAE

**Acer caudatum** Wall.

Rare in *Betula* forest, fruiting, Gangotri-Kedarganga, 3246 m, 37369, Sept. 1967.

## FABACEAE (PAPILIONACEAE)

**Astragalus cashmirensis** Bunge

Common near water and on the glacial soil, flowering and fruiting, Gangotri-Gaumukh, 3246-3922 m, Sept. 1967.

**A. himalayanus** Klotzsch

Rare on the glacial soil, flowering and fruiting, Puspavasha, 3900 m, 37437, Sept. 1967.

**Caragana crassicaulis** Benth.

Rare on the rocks, fruiting, on way to Sivalinga, 4725-5000 m, 37442, Sept. 1967.

**Indigofera heterantha** Wall. ex Brandis

Common in *Cedrus* forest, Harsil, 2560 m, 37328, Sept. 1967.

**Thermopsis barbata** Royle

Common in *Betula* forest, fruiting, Gangotri-Kedarganga, 3246 m, 37382, Sept. 1967.

**Trigonella pubescens** Edgew. ex Baker

Common in moist places, flowering and fruiting, Gangotri, 3246 m, 37505, Oct. 1967.

**Vicia pallida** Turcz.

Common in *Cedrus* forest, flowering, Harsil, 2560 m, 37322, Sept. 1967.

## ROSACEAE

**Cotoneaster garhwalensis** Klotz

Common on the rocks, fruiting, Bhojbasha environs, 3500-3700 m, 37491, Oct. 1967.

**C. rosea** Edgew.

Common, fruiting, Gangotri-Rudragaira, 3246 m, 37359, Sept. 1967.

**Fragaria vesca** Linn.

Common, flowering, Gangotri, 3246 m, 37517, Oct. 1967.

**Potentilla argyrophylla** Wall.

Common, flowering, base camp, 4725 m, 37459, Sept. 1967.

**P. eriocarpa** Wall.

Common, fruiting, Gangotri-Kedarganga 3246 m, 37373, Sept. 1967.

**P. fruticosa** Linn. var. **inglisii** (Royle) H. f.

Common on rocks, fruiting, base camp, 4725 m, 37460, Sept. 1967.

**P. gelida** C. A. Meyer

Common, flowering and fruiting, base camp, 4725 m, 37462, Sept. 1967.

**Pyrus lanata** Don.

Rare in *Betula* forest, fruiting, on way to Kedarganga, 3246 m, 37384, Sept. 1967.

**Rosa sericea** Lindle.

Very common in *Cedrus* and Pine forest, fruiting, Gangotri, 3246 m, 37390, Sept. 1967.

**Rubus pedunculatus** D. Don.

Common, flowering, Harsil, 2560 m, 37527, Oct. 1967.

**Sibbaldia parviflora** Willd.

Common, fruiting, Tapovan, 4200-4700 m, 37412, Sept. 1967.

**Sorbaria tomentosa** (Lindl.) Rehder

Common, fruiting, Harsil, 2560 m, 37305, Sept. 1967.

**Sorbus aucuparia** Linn.

Rare, fruiting, Bhojbasha environs, 3500-3700 m, 37492, Oct. 1967.

**Spiraea canescens** D. Don.

Common, flowering, Gangotri, 3246 m, 37506, Oct. 1967.

**S. vestita** Wall.

Common, flowering, Harsil, 2560 m, 37325, Sept. 1967.

## SAXIFRAGACEAE

**Bergenia stracheyi** (H. f. & Th.) Engl.

Rare on rocks, fruiting, Tapovan, 4200-4700 m, 37416, Sept. 1967.

**Ribes uva-crispa** Linn. var. **sativum** DC.

Common, fruiting, on way to Rudragaira, 3246 m, 37354, Sept. 1967.

**Saxifraga flagellaris** Willd.

Rare on rocks, flowering, on way to Sivalinga, 4725-5000 m, 37449, Sept. 1967.

**S. jacquemontiana** Dcne.

Rare on moraine, flowering, Sivalinga base and Kirtibhamak glacier, 5000 m, 37451 and 37481 Sept. 1967.

## CRASSULACEAE

**Sedum acuminatum** A. DC.

Common on rocks, fruiting, Gaumukh, 3922 m, 37401, Sept. 1967.

**S. ewersii** Ledeb.

Common, flowering, on way to Rudragaira, 3246 m, 37355, Sept. 1967.

**S. tibeticum** H. f. & Th.

Rare, flowering and fruiting, Gaumukh, 3922 m, 37406, Sept. 1967.

## ONAGRACEAE

**Epilobium latifolium** Linn.

Common on moraine, flowering and fruiting, Gaumukh, 3922 m, 37394, Sept. 1967.

**E. royleanum** Hausskn. forma **glabrum**

Rare near water, flowering and fruiting, Gangotri, 3300 m, 37499, Oct. 1967.

## DATISCEAE

**Datisca cannabina** Linn.

Rare in *Cedrus* forest, flowering and fruiting, Harsil, 2560 m, 37312 and 37313, Sept. 1967.

## APIACEAE (UMBELLIFERAE)

**Archangelica himalaica** Cl.

Common in *Betula* forest, fruiting, on way to Kedarganga, 3246 m, 37383, Sept. 1967.

**Bupleurum falcatum** Linn.

Common throughout, flowering and fruiting, on way to Rudragaira, 3246 m, 37360, Sept.-Oct. 1967.

**B. longicaule** Wall.

Common on rocks, flowering, Gaumukh, 3922 m, 37392, Sept. 1967.

**Chaerophyllum reflexum** Lindl.

Common in *Cedrus* forest, fruiting, Harsil, 2560 m, 37332, Sept. 1967.

**Heracleum thomsoni** C. B. Cl.

Rare in moist places, flowering, near Gangotri, 3300 m, 37500, Oct. 1967.

**Ligusticum elatum** C. B. Cl.

Rare on moraine, fruiting, on way to Pushpavasha, 4200 m, 37430, Sept. 1967.

**Pleurospermum candollii** Benth.

Rare on rocky slopes, fruiting, on way to Sivalinga, 4900-5000 m, 37450, Sept. 1967.

**Torilis japonica** (Houtt.) DC.

Common in *Cedrus* forest, flowering, Harsil, 2560 m, 37333, Sept. 1967.

**Trachydium roylei** Lindl.

Common, flowering and fruiting, around base camp, 4725 m, 37463, Sept. 1967.

## ARALIACEAE

**Hedera nepalensis** Koch.

Rare in *Cedrus* forest, flowering, Harsil, 2560 m, 37327, Sept. 1967.

## CAPRIFOLIACEAE

**Abelia triflora** R. Br.

Common, flowering, Gangotri, 3246 m, 37509, Oct. 1967.

**Lonicera hypoleuca** Dcne.

Rare, fruiting, on way to Rudragaira, 3246 m, 37356, Sept. 1967.

**L. quinquelocularis** Hardw.

Rare, fruiting, on way to Rudragaira, 3246 m, 37366, Sept. 1967.

**Viburnum cotinifolium** D. Don.

Common, fruiting, Gangotri-Rudragaira, 3246 m, 37365, Sept. 1967.

## RUBIACEAE

**Galium aparine** Linn.

Common near water, flowering and fruiting, near Gangotri, 3246 m, 37348, Sept. 1967.

**G. asperifolium** Wall. ex Roxb.

Common in moist places, flowering, Harasil, 2560 m, 37315, Sept. 1967.

## DIPSACACEAE

**Dipsacus mitis** D. Don.

Common, flowering. Harasil, 2560 m, 37331, Sept. 1967.

**Morina coulteriana** Royle

Common on either side of the road, fruiting, Bhojbasha-Chirbasha, 3300 m, 37495, Oct. 1967.

## ASTERACEAE (COMPOSITAE)

**Ainsliaea aptera** DC.

Common in *Cedrus* forest, flowering heads, Harasil, 2560 m, 37323, Sept. 1967.

**Anaphalis cuneifolia** Hook. f.

Common, flowering heads, Gangotri-Gaumukh, 3246-3922 m, 37347, 37400, 37428, Sept. 1967.

**A. margaritacea** Benth. ex Hook. f. subsp. **angustior** Kitamura

Common in *Cedrus* forest, flowering heads, Harasil to Gangotri, 2560-3300 m, 37334, 37503, Sept. 1967.

**A. nepalensis** (Spreng.) Hand-Mazz.

Common on glacial soil, flowering heads, Gaumukh, Pushpavasha, 4200 m, 37429, Sept. 1967.

**Anaphalis** sp.

Rare in rocky crevices, flowering heads, around base camp, 4725 m, 37464, Sept. 1967.

**Artemisia roxburghiana** Besser var. **grata**

Common, flowering heads, Gangotri-Rudragaira, 3246 m, 37363, Sept. 1967.

**A. roxburghiana** Besser var. **purpurascens**

Rare, flowering heads, Tapovan, 4200 m, 37423, Sept. 1967.

**A. sacrorum** Ledeb.

Common, flowering heads, Gangotri, 3246 m, 37345, Sept. 1967.

**A. stricta** Edgew.

Common, flowering heads, Gangotri-Gaumukh, 3246-3900 m, 37344, 37407, Sept. 1967.

**Aster albescens** (DC.) Hand-Mazz.

Common, flowering heads, Gangotri, 3246 m, 37336, Sept. 1967.

**Cicerbita macrorhiza** (Royle) Beauv.

Common, flowering heads, Gangotri, 3246 m, 37514, Oct. 1967.

**Cremanthodium decaisnei** C. B. Cl.

Rare on rocky slopes, flowering heads, on way to Sivalinga, 4725 m, 37443, Sept. 1967.

**Dubyaea hispida** DC.

Common, flowering heads, Pushpavasha, 4200 m, 37431, Sept. 1967.

**Erigeron alpinus** Linn.

Common, flowering and fruiting heads, Gaumukh and Pushpavasha, 4200 m, 37436, Sept. 1967.

**E. multicaulis** DC.

Common in *Betula* forest, flowering heads, Gangotri-Kedarganga, 3246 m, 37393, 37372, Sept. 1967.

**E. umbrosus** (Kar et Kir.) Boiss.

Common in *Cedrus* forest, fruiting heads, Gangotri-Rudragaira, 3246 m, 37357, Sept. 1967.

**Helinium grandiflorum** (Willd.) O. Kuntze

Common near water, flowering heads, Gangotri, 3300 m, 37501, Oct. 1967.

**Lactuca dolichophylla** Kitamura

Common in *Cedrus* forest near water, flowering heads, near Gangotri, 3200 m, 37504, Oct. 1967.

**L. lessertiana** C. B. Cl.

Rare on rocky slopes, fruiting heads, on way to Sivalinga, 5000 m, 37444, Sept. 1967.

**Leontopodium alpinum** Cass.

Common on rocks, flowering heads, around base camp, 4725 m, 37465, Sept. 1967.

**Leontopodium** sp.

Rare near water on a big boulder, dried heads, on way to base camp, 4700 m, 37439, Sept. 1967.

**Myriactis nepalensis** Less.

Common in *Cedrus* forest, flowering heads, Harasil, 2560 m, 37319, Sept. 1967.

**Picris hieracioides** Linn.

Common in *Cedrus* forest, flowering heads, Harasil, 2560 m, 37531, Oct. 1967.

**Saussurea albescens** H. f. & Th.

Common in *Cedrus* and *Pinus* forest, flowering heads, Gangotri, 3246 m, 37507, Oct. 1967.

**S. obvallata** Wall. ex Cl.

Rare on rocky slopes, fruiting heads, on way to Sivalinga, 4725 m, 37446, Sept. 1967.

**S. roylei** Cl.

Rare on moist moraines, fruiting heads, Bhojbasha-Chirbasha, 3246-3300 m, 37520, Oct. 1967.

**S. sacra** Edgew.

Common near snowline, flowering heads, Sivalinga base and Kirtibhamak glacier, 5500 m, 37447, Sept. 1967.

**Sonchus oleraceus** Linn.

Rare near water, flowering heads, Gangotri-Harsil, 3246-2560 m, 37535, Oct. 1967.

**Senecio chrysanthemoides** DC.

Common near water, flowering heads, Harsil, 2560 m, 37320, Sept. 1967.

**S. pedunculatus** Edgew.

Common, flowering heads, Gangotri, 3246 m, 37352, Sept. 1967.

**Tanacetum nubigenum** Wall.

Common on rocks, flowering and fruiting heads, Gangotri-Tapovan, 3246-4200 m, 37370, 37419, Sept. 1967.

**T. senecionis** Gay.

Common on moraine, fruiting heads, Gaumukh, 3922 m, 37399, Sept. 1967.

**Waldheimia glabra** Regel.

Rare on moraine, flowering heads, Sivalinga base, and Kirtibhamak glacier, 5000 m, 37452, Sept. 1967.

## ERICACEAE

**Cassiope fastigiata** (Wall.) D. Don.

Common in moist places, fruiting, Tapovan, 4200 m, 37417, Sept. 1967.

**Rhododendron anthopogon** D. Don.

Common on rocks, fruiting, Gaumukh, 4200 m, 37426, Sept. 1967.

**Rhododendron** sp.

Rare on rocky slopes, fruiting, on way to Sivalinga, 4725 m, 37448, Sept. 1967.

## MONOTROPACEAE

**Hypopithys lanuginosa** Nutt.

Rare in *Cedrus* forest, flowering, on way to Rudragaira, 3246 m, 37349, Sept. 1967.

## PRIMULACEAE

**Androsace lanuginosa** Wall.

Common near water, fruiting, Gangotri, 3246 m, 37513, Oct. 1967.

**A. sarmentosa** Wall.

Rare, flowering, Tapovan, 4200 m, 37414, Sept. 1967.

**Primula minutissima** Jacq.

Common in moist places, flowering, Tapovan, 4200 m, 37410, Sept. 1967.

**P. nivalis** Pall. var. **macrophylla** (D. Don.) Pax.

Rare around the boulders, fruiting, base camp, 4725 m, 37474, Sept. 1967.

## OLEACEAE

**Syringa emodi** Wall. ex D. Don.

Rare in *Betula* forest, fruiting, on way to Kedar-ganga, 3246 m, 37386, Sept. 1967.

## GENTIANACEAE

**Gentiana stipitata** Edgew.

Rare on rocks, flowering, near base camp, 4725 m, 37466, Sept. 1967.

**G. tubiflora** Wall.

Rare on moraine, flowering and fruiting, Kirtibhamak glacier, 5300 m, 37489, Oct. 1967.

**Gentiana** Sp.

Rare, flowering and fruiting, Pushpavasha, 4200 m, 37427, Sept. 1967.

**Halenia elliptica** D. Don.

Common in *Cedrus* forest near water, Harsil, 2560 m, 37321, Sept. 1967.

**Lomatogonium carinthiacum** (Wulf.) Reichb.

Common in moist places, flowering, Tapovan, 4200 m, 37408, Sept. 1967.

**Swertia cordata** Wall. ex Cl.

Common in *Cedrus* and *Pinus* forest, flowering and fruiting, Harsil, 2560 m, 37525, Oct. 1967.

## BORAGINACEAE

**Cynoglossum glochidiatum** Wall. ex Benth.

Common, flowering and fruiting, Gangotri-Gaumukh, 3200-3900 m, 37343, Sept. 1967.

**Eritrichium thomsoni** (C. B. Cl.) Johnst.

Rare in between big boulders in shade, flowering and fruiting, around base camp, 4725 m, 37468, Sept. 1967.

**Lasiocarpum munroi** (C. B. Cl.) Johnst.

Rare on moraine, flowering and fruiting, around base camp, 4725 m, 37461, Sept. 1967.

**Myosotis arvensis** (L.) Hill

Rare in *Betula* forest, flowering, on way to Kedar-ganga, 3246 m, 37376, Sept. 1967.

## SCROPHULARIACEAE

**Leptorhabdos parviflora** Benth.

Common, fruiting, on way to Rudragaira, 3246 m, 37367, Sept. 1967.

**Pedicularis porrecta** Wall.

Common, flowering and fruiting, Gangotri-Tapovan, 3246 m, 4000 m, 37375, Sept. 1967.

**Veronica ciliata** Fisch.

Common, fruiting, around base camp, 4725 m, 37458, Sept. 1967.

**V. lanosa** Royle

Rare, fruiting, on way to Rudragaira, 3246 m, 37368, Sept. 1967.

## LAMIACEAE (LABIATAE)

**Clinopodium vulgare** Linn.

Common in *Betula* forest, fruiting, on way to Kedar-ganga, 3246 m, 37378, Sept. 1967.

**Elsholtzia cristata** Willd.

Common, flowering, Harsil, 2560 m, 37309, Sept. 1967.

**Elsholtzia** sp.

Rare, flowering and fruiting, around base camp, 4725 m, 37475, Sept. 1967.

**Leonurus cardiaca** Linn.

Common near water, flowering, near Gangotri, 3246 m, 37502, Oct. 1967.

**Origanum vulgare** Linn.

Common, flowering, Harsil, 2560 m, 37318, Sept. 1967.

**Plectranthus rugosus** Wall.

Common along roads, flowering, Harsil, 2560 m, 37304, Sept. 1967.

**Prunella vulgaris** Linn.

Common in moist places in *Cedrus* forest, flowering, Harsil, 2560 m, 37311, Sept. 1967.

**Salvia nubicola** Sw.

Common throughout, flowering, Harsil to Gangotri, 2560-3246 m, 37303, Sept. 1967.

**Thymus serpyllum** Linn.

Common, flowering, Gangotri-Gaumukh, 3200-3900 m, 37377, Sept. 1967.

## PLANTAGINACEAE

**Plantago major** L.

Common in *Cedrus* and *Pinus* forest, fruiting, Harsil, 2560 m, 37523, Oct. 1967.

## NYCTAGINACEAE

**Oxybaphus himalaicus** Edgew.

Common throughout, flowering, Harsil, 2560 m, 37301, Sept. 1967.

## CHENOPODIACEAE

**Axyris amaranthoides** Linn.

Common, flowering, Gangotri, 3246 m, 37338, Sept. 1967.

**Chenopodium botrys** Linn.

Common, flowering, Gangotri, 3246 m, 37346, Sept. 1967.

## POLYGONACEAE

**Aconogonum tortuosum** (D. Don.) Hara

Common on moraine, flowering, Gangotri and Gaumukh, 3246-4000 m, 37358, Sept. 1967.

**Bilderdykia pterocarpa** (Wall.) Greene

Common, fruiting, Harsil, 2560 m, 37306, Sept. 1967.

**Bistorta amplexicaulis** (D. Don.) Greene

Common throughout, flowering, Harsil, 2560 m, 37529, Sept. 1967.

**Fagopyrum esculentum** Moench

Common throughout, flowering, Gangotri, 3246 m, 37335, Sept. 1967.

**Koenigia delicatula** (Meisn.) Hara

Common on moraine, flowering, Tapovan, 4700 m, 37421, Sept. 1967.

**Oxyria digyna** (L.) Hill

Rare on moraine, flowering, Gaumukh, 4200 m, 37438, Sept. 1967.

**Persicaria nepalensis** (Meisn.) H. Gross

Common in *Cedrus* and *Pinus* forest, flowering, Harsil, 2560 m, 37314, Sept. 1967.

**Polygonum affine** D. Don.

Common on rocks, flowering, Gaumukh, 4200 m, 37433, Sept. 1967.

**P. glaciale** Hook. f.

Rare near water, flowering, around base camp, 4725 m, 37473, Sept. 1967.

**P. nummularifolium** Meisn.

Rare in rocky crevices, flowering, near base camp, 4725 m, 37445, Sept. 1967.

**P. recumbens** Royle ex Bab.

Common, flowering, Gangotri, 3246 m, 37510, Oct. 1967.

**Rheum webbianum** Royle

Common in blue pine forest, fruiting, Chirbasha, 3400 m, 37493, Oct. 1967.

## ELAEAGNACEAE

**Hippophae rhamnoides** Linn.

Common on moraine, fruiting, Gaumukh, 4000 m, 37398, Sept. 1967.

**H. rhamnoides** Linn. subsp. **salicifolia** (D. Don.) Serv.

Common on river banks, fruiting, Harsil, 2560 m, 37302, Sept. 1967.

## URTICACEAE

**Cannabis sativa** Linn.

Common throughout, flowering, Gangotri, 3246 m, 37337, Sept. 1967.

**Parietaria debilis** G. Forst.

Rare in shade, flowering, Harsil, 2560 m, 37310, Sept. 1967.

## BETULACEAE

**Betula utilis** D. Don.

Common throughout, cones, Gangotri-Kedarganga and Bhojbasha, 3246-3400 m, 37385, Sept. 1967.

## SALICACEAE

**Salix hastata** Linn.

Rare on moraine, flowering buds, Gaumukh, 3900 m, 37397, Sept. 1967.



## MONOCOTYLEDONS

## ORCHIDACEAE

**Epipactis latifolia** Swartz.

Common in *Pinus* and *Cedrus* forest, fruiting. Harsil, 2560 m, 37528, Oct. 1967.

**Goodyera repens** (L.) R. Br.

Common in *Pinus* and *Cedrus* forest, fruiting. Gangotri, 3246 m, 37350, Sept. 1967.

**Neottia listeroides** Lindl.

Rare in *Cedrus* forest, fruiting, on way to Kedarganga, 3246 m, 37374, Sept. 1967.

## DIOSCOREACEAE

**Dioscorea deltoidea** Wall. ex Kunth

Rare near water, fruiting, on way to Harsil from Gangotri, 3200 m, 37534, Oct. 1967.

## LILIACEAE

**Allium stracheyi** Baker

Common, flowering, on way to Rudragaira, 3246 m, 37351, Sept. 1967.

**Asparagus filicinus** Ham. ex D. Don.

Common in *Cedrus* forest, fruiting, on way to Rudragaira, 3246 m, 37364, Sept. 1967.

**Lilium nepalense** D. Don.

Rare in *Betula* forest, fruiting, on way to Rudragaira, 3246 m, 37508, Oct. 1967.

## JUNCACEAE

**Juncus himalensis** Klotz

Common in moist places, fruiting, Tapovan, 4700 m, 37424, Sept. 1967.

**Luzula spicata** DC.

Common on moraine, flowering, Kirtibhamak glacier, 5300 m, 37485, Oct. 1967.

## CYPERACEAE

**Bulbostylis densa** (Wall. ex Roxb.) Hand-Mazz.

Common in *Cedrus* and *Pinus* forest, fruiting. Harsil, 2560 m, 37316, Sept. 1967.

**Carex nivalis** Boott.

Rare on moraine, fruiting, on way to Sivalinga. 5000 m, 37441, Sept. 1967.

**Kobresia nitens** C. B. Clarke

Rare on moraine, fruiting, Kirtibhamak glacier, 5300 m, 37488, Oct. 1967.

## POACEAE (GRAMINEAE)

**Agropyron longiaristatus** Boiss.

Common, flowering spikes, around base camp, 4725 m, 37455, Sept. 1967.

**Calamagrostis pseudophragmites** (Hall. f.) Koelber

Common throughout, flowering spikes, Gangotri and Harsil, 2560-3300 m, 37342, Sept.-Oct. 1967.

**Dactylis glomerata** Linn.

Common, flowering spikes, Gangotri, 3246 m, 37381, Sept. 1967.

**Danthonia cachemyriana** Jaub. et Spach.

Common, flowering spikes, on way to Kedarganga, 3246 m, 37341, Sept. 1967.

**Deyeuxia pulchella** (Griseb.) Hook. f.

Common, flowering spikes, Tapovan, 4200 m, 37418, Sept. 1967.

**Festuca valisiaca** Schleich. ex Gaud.

Common, flowering spikes, Tapovan-Kirtibhamak glacier, 4200-5400 m, 37420, Sept.-Oct. 1967.

**Oryzopsis lateralis** (Regel.) Stapf apud. Hook. f.

Common, flowering spikes, Gangotri, 3246 m, 37340, Sept. 1967.

**Pennisetum lanatum** Klotz.

Common, flowering spikes, on way to Kedarganga, 3246 m, 37379, Sept. 1967.

**Panicum miliaceum** Linn.

Common, flowering spikes, Harsil, 2560 m, 37533, Oct. 1967.

**Poa bulbosa** Linn. var. **vivipara** Koel.

Common on rocks, viviparous, around base camp, 4200 m, 37425, Sept. 1967.

**Trisetum spicatum** (L.) Richt.

Common on moraine, flowering spikes, Kirtibhamak glacier, 5400 m, 37486, Oct. 1967.

## GYMNOSPERMS

## GNETACEAE

**Ephedra gerardiana** Wall.

Common on rocks and moraine, fruiting, Gaurmukh, 4000 m, 37396, Sept. 1967.

## PINACEAE

**Cedrus deodara** Roxb.

Common throughout, cones, Harsil to Gangotri, 2500-3300 m, 37308, Sept. 1967.

**Pinus wallichiana** Jacks.

Common throughout, cones, Harsil to Chirbasha, 2500-3300 m, 37490, Sept. 1967.

## CUPRESSACEAE

**Juniperus communis** Linn. var. **saxatilis** Pallas

Common on rocks, cones, on way to Rudragaira, 3246 m, 37361, Sept. 1967.

**J. wallichiana** (Hook. f. et Thoms. ex Parl.) Brandis

Common on rocks, cones, on way to Kedarganga, 3246 m, 37391, Sept. 1967.

## TAXACEAE

- Taxus baccata** Linn. subsp. **wallichiana** (Zucc.) Pilger  
Rare in *Cedrus* and *Pinus* forest, cones, Gangotri, 3246 m, 37515, Oct. 1967.

## PTERIDOPHYTES

## PTERIDACEAE

- Adiantum venustum** D. Don.  
Common in shade, sori, Harsil to Gangotri, 2560-3300 m, 37326, Sept.-Oct. 1967.

## ASPIDIACEAE

- Polystichum lachenense** (Hook.) Bedd.  
Common in moist places, sori, Tapovan and around base camp, 4200-4700 m, 37476, Sept. 1967.  
**P. prescottianum** (Wall. ex Mett.) Moore  
Common in moist places, sori, around base camp, 4725 m, 37454, Sept. 1967.

## ASPLENIACEAE

- Asplenium septentrionale** Hoffm.  
Common on big boulders in crevices, sori, Gangotri, 3246 m, 37339, Sept. 1967.  
**A. trichomanes** Linn.  
Rare in *Cedrus* forest, in moist places, sori, Harsil, 2560 m, 37329, Sept. 1967.

## POLYPODIACEAE

- Crypsinus malacodon** (Hook.) Copeland  
Common on rocks, sori, on way to Kedarganga, 3246 m, 37371, Sept. 1967.

**Cryptogramme crispa** R. Br.

Common on moraine near big boulders, sori, Gaumukh, 4000 m, 37402, Sept. 1967.

**Polypodium linearis** Thunb.

Common in *Cedrus* forest, sori, Gangotri, 3246 m, 37511, Oct. 1967.

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