



A contribution to

The Botany of Nanda Devi National Park

BOTANICAL SURVEY OF INDIA, DEPARTMENT OF ENVIRONMENT

A contribution to
The Botany of Nanda Devi National Park
in Uttar Pradesh, India.

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Cover photo : Mt. Nanda Devi with its snow-clad peak (7816 m)

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FOREWORD

In the recent past our natural forest wealth has been greatly depleted both in terms of quality and quantity due to various reasons. In this process, many species of plants have suffered destruction and some have reached near extinction; some are even considered to have become extinct.

To arouse awareness about conservation of flora of our country, and in keeping with the efforts elsewhere in the world, a small illustrated booklet entitled: *Threatened Plants of India — A State-of-the-Art Report* (Jain and Sastry, 1980) was published by the Botanical Survey of India. To intensify efforts and to bring to light more data on plants in danger, since 1980 a five year Project entitled Project on Study, Survey and Conservation of Endangered Species of Flora (POSSCEF) with the financial support from the United States Fish & Wildlife Service has been initiated in the Botanical Survey of India.

In the Botanical Survey as also in POSSCEF we considered that priority should be given to study of National Parks and prospective Biosphere Reserve areas. Studies have been made in Corbett National Park, Silent Valley area, Dudhwa National Park, Kaziranga National Park, Dachigam, Periyar, Manas Sanctuary, etc.

Dr. P. K. Hajra, Project Officer, at the Northern Centre of the Project at Dehra Dun has been entrusted with the study of the rare

flora of the northern and north-western region to prepare lists of rare, threatened and endemic species of flowering plants of that region. In pursuit of these objectives, Dr. Hajra, undertook two tours in the Nanda Devi National Park area with a view to mainly locate and study rare plants; he has also made general observations on the botanical wealth and causative factors leading to the rarity of certain plant species.

As no recent botanical information was available on plant wealth of this important area, it was considered appropriate to publish Dr. Hajra's observations and inventory of plants collected by him.

Mr. A. R. K. Sastry, Project Coordinator, POSSCEF, has assisted me in editing the manuscript. It is hoped that this brief contribution to the botany of Nanda Devi National Park will give a glimpse of the rich and beautiful flora of the region.

Indian Botanic Garden,
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March 1, 1983.

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A contribution to

THE BOTANY OF NANDA DEVI NATIONAL PARK IN UTTAR PRADESH, INDIA

The work gives a brief account of botany of the Nanda Devi National Park, in Uttar Pradesh, India. The Park has India's second highest mountain peak and a unique flora and fauna. The vegetation and flora as observed during two field trips is described.

Introduction :

The Nanda Devi National Park lies approximately between 30° 16' and 30° 32' N. and 79° 44' — 80° 02' E with an area of about 800 sq km and a range of altitude from about 3500 m to 7800 m in the Chamoli district of Uttar Pradesh.

The eastern and southern rims of the Park form the border of Chamoli district with Pithoragarh and Almora districts respectively.

The Park is famous for its unique flora and the Musk deer, the Himalayan Blue sheep, Snow leopard, Goral or goat antelope, etc.

A detailed study of the flora of this region has not been made so far. Hence, it is appropriate to record some observations on this botanically rich area, made during two seasonal exploration trips.

The first field work was done during August-Sept., 1981. Usually the expedition parties follow the old route through Lata or Reni. In the present study a recently opened route was followed from Surraithota, a village on the Joshimath-Niti pass road, and from Surraithota to Tolma another village at ca 3 km and then to Himtoli, Dharansi, Dibrugetha, Ramani, and Bhujgara. On way to the Park, the vegetation near the village shows evidence of the impact of human interference, with stretches of cultivated lands, dotted here and there with groves of a few trees of *Cedrus deodara* (Roxb.) Loud., *Cupressus torulosa* D. Don, *Pinus wallichiana* A. B. Jack., etc.

The view changes rather abruptly as one enters the Lata range i.e., the northwestern boundary of the Park. There are thickly

wooded slopes all round and the most common trees in such areas are *Abies pindrow* (Royle) Spach., *A. spectabilis* (D. Don) Spach., *Acer acuminatum* Wall. ex G. Don, *Betula utilis* D. Don, *Pinus wallichiana* A. B. Jack., *Rhododendron campanulatum* D. Don, *Sorbus foliolosa* (Wall.) Spach., etc. The tree layer is dense. With gradual elevation the dominant plants also become different and at Dharansi pass there are no tree species and the vegetation is composed of dwarf shrubs and herbaceous plants.

Field work was again done during June-July 1982 and this time the Rishiganga River banks were explored. Collections were made all along the river banks, while trekking from Dibrugetha to Reni via Sonnwara and Pangrani. *Juglans regia* L., *Acer acuminatum* Wall. ex D. Don, *Celtis australis* L., *Populus ciliata* Wall. ex Royle, *Salix oxycarpa* Anders., *Rhododendron arboreum* Sm., *Picea smithiana* (Wall.) Boiss., *Pinus wallichiana* A. B. Jackson, *Taxus baccata* L., *Ulmus wallichiana* Planch., etc. are prominent among the trees. Besides these, *Arundinaria spathiflora* Trin. and *A. falcata* Nees, the two species of small bamboos are also common along the river banks. *Calanthe tricarinata* Lindl., and *Oreorchis micrantha* Lindl., the two rare ground orchids, were collected from the area.

In addition, collections were also made while trekking from Lata to Latakharak via Belta and then to Dharansi, Dibrugetha, Deodi, Ramani, Bhujgara, Patakhana and Sarsaupatal.

Area and Topography :

The National Park has high mountain ridges and as such the access to the Park is comparatively difficult and possible only through the northwest for a short period from June till October. The terrain is one of the most rugged with successive hills of varying heights.

Geology :

Geologically this area has been tentatively divided into four formations i.e., Lata, Ramani, Kharapatal and Martoli. The rocks in the Park are highly metamorphosed crystalline type of the

Vaikrita group and the lowest part of the Tethysediments. (Marou' the Yugi, 1979).

Climate:

There is heavy rainfall from the third week of June to first week of August. On the whole, the climate is dry with low annual precipitation. Snow is thicker and is generally seen at lower altitudes on the southern side of the National Park than on the northern slopes.

There is considerable inflow of warm air up the gorge resulting in light mist over the high meadows and this warm air has a profound effect on the wintery conditions which linger on late into the summer. The mists and low clouds in June keep the soil moist which in turn helps in supporting luxuriant vegetation. (Khacher, 1978).

Vegetation:

The Park, situated in the border of Garhwal and Kumaon Himalayas of Uttar Pradesh supports an altitudinally distributed vegetation dense in growth and diverse in its rich species content. Its geographical location, climate and topography have all contributed to the characteristic vegetation and flora of the area. Due to relative noninterference of the forests by man there are still many virgin forest patches throughout the Park. However, the stratification is not clearly distinguishable as the topography is irregular and disturbed by valleys and plateaus of various extent. Broadly, the following main vegetational types can be indicated :

(i) **Abies-Rhododendron-Betula forests:**—These forests are generally met with near Latakharak, Himtoli, Dibrugheta, Deodi and Ramani, at an altitude of about 3350 m. *Abies pindrow* (Royle) Spach., *A. spectabilis* (D. Don) Spach., *Rhododendron campanulatum* D. Don, *Betula utilis* D. Don are the common tree species (Pl. 2). Besides these, shrubby and herbaceous plants like *Rosa macrophylla* Lindl., *Viburnum cotinifolium* D. Don, *Senecio alatus* Wall. ex DC., *Smilacina pallida* Royle, *Thalictrum reniforme* Wall., etc. are also common in the forest.

(ii) **Betula-Rhododendron forests:**—There is pure stand of *Betula utilis* D. Don and *Rhododendron campanulatum* D. Don forests below the Alpine meadows. (Pl. 3 & 4).

(iii) **Alpine meadows:**—The Alpine meadows lack tree species. Shrubby plants like *Cotoneaster microphyllus* Wall. ex Lindl., *Juniperus pseudosabina* Fisch. & Mey., *Rhododendron anthopogon* D. Don, *R. lepidotum* Wall. ex G. Don, *Salix fruticulosa* Anders., etc. are common. The dominant herbaceous plants are *Aconitum violaceum* Jacq., *Allium stracheyi* Baker, *A. wallichii* Kunth, *Anaphalis* spp., *Aster asteroides* (DC.) O. Ktze. subsp. *asteroides*, *A. diplostephoides* (DC.) C.B. Clarke, *Bergenia stracheyi* (Hook. f. & Thoms.) Engl., *Carex nivalis* Boott, *Cassiope fastigiata* D. Don, *Chamaescidium garhwalicum* (Wolf) Norman, *Corydalis* spp., *Cyananthus lobatus* Wall. ex Benth., *C. microphyllus* Edgew., *Dactylis glomerata* L., *Danthonia cachemyriana* Jaub. & Spach, *Epilobium* spp., *Euphrasia kurramensis* Pennell, *Festuca gigantea* Vill., *Gentiana venusta* (G. Don) Griseb., *Gentianella pedunculata* (Royle) H. Sm., *Iris kumaonensis* Wall. ex G. Don, *Juncus* spp., *Jurinea macrocephala* (DC.) C.B. Clarke, *Kobresia capillifolia* (Decne.) C.B. Clarke, *K. schoenoides* (Chuby) Steud., *Leontopodium himalayanum* DC., *Morina longifolia* Wall. ex DC., *Nomocharis oxypetala* (Royle) Balf. f. ex W. E. Evans, *Oxyria digyna* (L.) Hill, *Parnassia nubicola* Wall. ex Royle, *Pedicularis hoffmeisteri* Klotz, *Pleurospermum brunonis* C. B. Clarke, *Poa* spp., *Polygonum affine* D. Don, *P. viviparum* L., *Polystichum prescottianum* Wall. ex Hook. f., *Potentilla atrosanguinea* Lodd., *Saxifraga brunoniana* Wall., *S. fimbriata* Wall., *Sedum* spp., *Taraxacum officinale* Wigg., etc. (Pl. 5).

Besides these there can also be seen in the forest, overhanging and sometimes clasping, grey-green to ash brown layers of lichens, a group often neglected, but certainly deserving attention not only as a hardy element in the flora but also for their picturesque nature. Some of them are species of *Usnea* with long, creeping, string-like thallus, freely branching and foliose lichens with leaf like, lobed to deeply incised thallus like *Parmelia* with variously sized patches each dotted with large pin head like fertile bodies. These lichens are favoured by the musk deer during scarcity.



Plate 2. *Betula-Abies-Rhododendron* forest on way to Deodi from Dibrugheta.



Plate 3. *Betula-Rhododendron* forest near Latakharak.

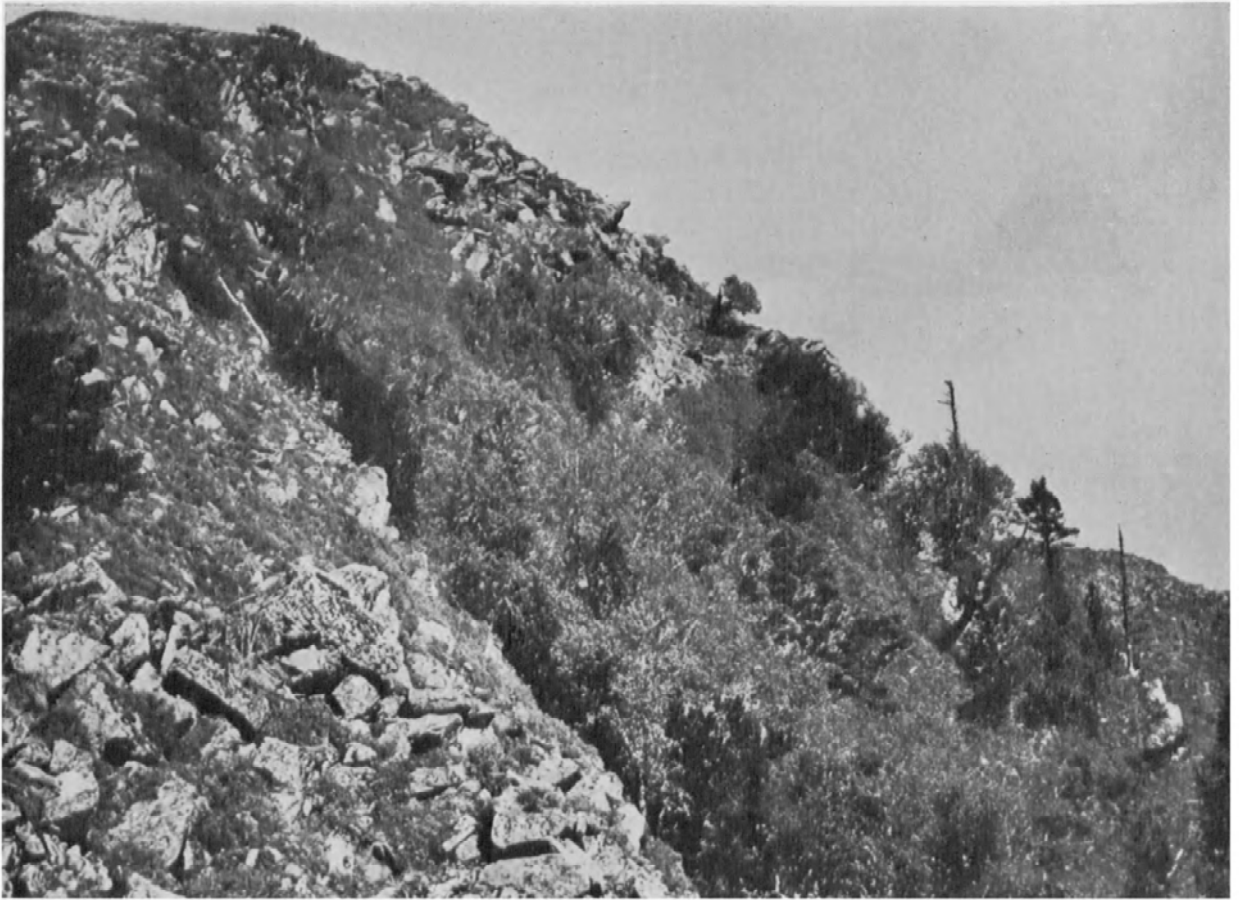


Plate 4. *Betula-Abies* forest near Dibrugheta.



Plate 5. Alpine meadows at Sarsaupatal.

The area is rich in different kinds of fleshy fungi like *Agaricus*, *Polyporus*, *Morchella* or the edible morale etc. The local porters and the shepherds collect the edible morale in large quantities for their consumption.

The parasitic plants collected inside the Park are *Xylanche himalaica* (Hook. f. & Thoms.) G. Beck, *Cuscuta europea* L., *Orobanche alba* Stephan and *Thesium himalense* Royle ex Edgew.

Among the saprophytes, mention may be made of the two ground orchids, *Epipogium aphyllum* Sw., and *Neottia listeroides* Lindl.

Rare plants:

The Park provides a good habitat for conservation of flora and there are many rare plants such as *Aconitum* spp., *Allium* spp., *Arnebia benthamii* (Wall. ex G. Don) Johnst., *Circaeaster agrestis* Maxim., *Cypripedium elegans* Reichb. f., *C. himalaicum* Rolfe ex Hemsl., *Dactylorhiza hatagirea* (D. Don) Soo, *Epipogium aphyllum* Sw., *Meconopsis aculeata* Royle, *Nardostachys grandiflora* DC., *Neottia listeroides* Lindl., *Picrorhiza kurrooa* Benth., *Podophyllum hexandrum* Royle, *Saussurea obvallata* (DC.) Sch.-Bip., *Stellera chamaejasme* L., *Thesium himalense* Royle ex Edgew., *Triosteum hirsutum* Wall., etc.

Biotic factors:

The vegetation in the Park is no longer pristine and should the following biotic factors continue to operate unchecked it is likely to become depauperate in due course.

Though the Park as such is free from human habitations there are human settlements along the fringes of the Park. These people belong to the pastoral community. They bring in their goats and sheep in large numbers into the Park for

grazing, particularly from June to September. The disastrous effects of such large scale grazing are indeed telling. The shepherds driving these flocks set fire to the old grass here and there so that they may get tender shoots next year for their flocks. These fires of course do consume most of the alpine shrubs like species of *Rhododendron*, *Juniperus*, etc. It should be emphasised in this connection that the ecological effects of such fires need detailed investigation.

The felling of trees by the expedition parties and the large number of porters accompanying them for warming themselves and for cooking their food too needs mention here.

Besides these, most of the porters being locals and knowledgeable about the medicinal plants of the area, collect some plants like *Picrorhiza kurrooa* Royle ex Benth., *Dactylorhiza hatagirea* (D. Don) Soo, *Arnebia benthamii* (Wall. ex G. Don) I. M. Johnst, etc. in large quantities. The large scale collection of these plants in flowering and fruiting deprives of the chances of regeneration of new plants coming up from the seeds/rhizomes and this has led to considerable depletion of such species. However, a few more visits are needed to assess the ecological impacts of grazing and collecting.

The following enumeration includes correct name of the species with original citation, brief description, the locality and the collection numbers. Plants are arranged according to Bentham and Hooker's classification; the genera and species within a family are arranged in alphabetical order. Every attempt has been made to bring the nomenclature up to date. Detailed descriptions have been avoided as they are available in published floras. All the specimens included in this list are preserved in the Herbarium of the Northern Circle, Botanical Survey of India (BSD).

The two explorations conducted in the Park have yielded a total number of 312 species distributed over 199 genera and 81 families.

ENUMERATION

ANGIOSPERMS

Dicotyledons

RANUNCULACEAE

Aconitum balfourii Stapf in Ann. Roy. Bot. Gdn. Cal. 10 :160, t. 104.1905.

Herbs, *ca* 1.0 m high. Flowers blue. Root poisonous. Deodi to Ramani, 73290.

Aconitum falconeri Stapf in Ann. Roy. Bot. Gard. Cal. 10 :163. 1905.

Herbs, *ca* 1.5 m high. Flowers blue, crowded at the end of the branches. Root poisonous. Ramani, 73316.

Aconitum violaceum Jacq. ex Stapf in Ann. Roy. Bot. Gard. Cal. 10 :144.1905.

Herbs, 10-30 cm high. Flowers blue, lax. Dharansi, 73433.

Actaea spicata L. var. **acuminata** (Wall. ex Royle) Hara in Jour. Jap. Bot. 51 :132.1976.

Erect herbs, 30-60 cm high. Flowers minute, white. Berry globose, black. Near Himtoli, 73525; on way to Deodi from Dibrugeta, 73703.

Anemone obtusiloba D. Don, Prodr. Fl. Nep. 194.1825.

Herbs, 15-30 cm high, rootstock clothed with old leaf-sheaths. Radical leaves 3-partite. Scape 1-3 flowered. Flowers white to blue. Dibrugeta, 73711.

Anemone polyanthes D. Don, Prodr. Fl. Nep. 194. 1825.

Herbs, *ca* 50 cm high. Leaves densely villous, long petioled. Flowers white. (Pl. 6). Ramani, 73339; Dharansi, 73429, 73566; Dibrugeta, 73794.

Anemone rupicola Camb. in Jacq. Voy. 4 (Bot.) : 5, t 2.1835.

Herbs, *ca* 15 cm high. Fruits a head of sessile achenes which is embedded in dense wool.

Near Ramani, 73362; Sarasupatal, 73933.

Clematis barbellata Edgew. in Trans. Linn. Soc. 20 : 25.1854.

Woody climber. Achenes with long feathery styles.

On way to Dibrugeta from Deodi, 73387.

Delphinium brunonianum Royle, Ill. 56.1834.

Herbs, upto 1.0 m high. Flowers large, pale blue, hairy.

On way to Bhujgara from Ramani, 73317.

Delphinium denudatum Wall. ex Hook. f. et Thoms. in Hook.

f. F1. Brit. India 1 :25.1872.

Herbs 15-30 cm high. Leaves divided to almost to the base.

Flowers blue, spur subulate.

Dibrugeta to Sonnwara, 73771.

Delphinium vestitum Wall. ex Royle, Ill. 55.1834.

Herbs, *ca* 70 cm high. Flowers blue, in long dense raceme, hairy.

Himtoli, 73484.

Oxygraphis polypetala (Royle) Hook. f. & Thoms. Fl. Ind. 1:27.1855.

Tufted low herbs. Leaves crenate-lobed. Scape 1-2.

Flowers yellow.

Dharansi, 73784.

Paraquilegia anemonoides (Willd.) Ulbr. Fedde, Repert. 12:369.1922.

Herbs, densely tufted, 10-20 cm high. Radical leaves 2-3 ternate, cauline 3-foliolate. Follicles 4, green.

Dharansi, 73456.

Paraquilegia microphylla (Royle) J. R. Drum. & Hutch. in Kew Bull. 1920.157, f 2.1920.

Herbs, densely tufted, *ca* 10 cm high, clothed with bristles. Flowers blue.

Dharansi, 72787; Patakhana to Bhujgara, 73798.



Plate 6. *Anemone polyanthes* D. Don.

Peraquilegia kareliniana (Drum.) Nevski in Acta Inst. Bot. Acad. Sci. URSS. ser. 1, fasc. 4:295.1973. *P.uniflora* (Aitch. & Hemsl.) Drum. & Hutch.
Herbs, 10-25 cm high densely tufted. Flowers blue.
Ramani to Bhujgara, 73334.

Ranunculus hirtellus Royle ex D. Don in Royle, III. Bot. Himal. 53.1834.
Herbs, pubescent. Flowers yellow. Achenes in a globose head.
On way to Deodi from Dibrugheta, 73393.

Ranunculus pulchellus C. A. Meyer in Ledeb. Fl. Alt. 2:333. 1830.
Herbs, 5-10 cm high, silky. Leaves lanceolate, entire. Flowers yellow.
Sarsaupatal, 73904, 73959.

Thalictrum alpinum L. Sp.Pl. 545. 1753.
Slender herbs, 10-15 cm high. Flowers greenish.
Dharansi, 73922; Sarsaupatal, 73958.

Thalictrum cultratum Wall. Pl. As. Rar. 2:26. 1831.
Herbs, ca 1.0 m high. Panicles lax. Flowers greenish-white.
Achenes short stalked.
Himtol, 73486.

Thalictrum elegans Wall. ex Royle, III. Bot. Himal. 51.1834.
Herbs, ca 30.0 cm high. Leaves decompound.
Flowers purplish-green. Achenes laterally compressed, stalked.
On way to Ramani from Deodi, 73296; Sarsaupatal, 73913.

Thalictrum pauciflorum Royle, III. Bot. Himal. 52. 1834.
Herbs, ca 60 cm high. Panicle with one flower at the end of branches. Fruits green with purple tips.
Near Ramani, 73299.

Thalictrum reniforme Wall. Pl.As. Rar. 2:26.1831.
Herbs, ca 1.0 m high, much branched. Panicle lax, decompound.
Flowers greenish white.
Dibrugheta, 73405.

PAEONIACEAE

Paeonia emodi Wall. ex Royle, III. Bot. Himal. 57.1834.
Herbs, ca 1.0 m high. Flowers white, in the axils of upper leaves.
Follicles one or two, curved.
Dibrugheta to Sonnwara, 73778.

CIRCAEASTERACEAE

Circaeaster agrestis Maxim. in Bull. Acad. St. Petersb. 27:556.1881.
Herbs, 4-6 cm high. Leaves spatulate with dichotomous venation. Flowers minute, creamy. (P1.7).
On way to Dibrugheta from Dharansi, 73210.

BERBERIDACEAE

Berberis edgeworthiana Schneid. in Bull. Herb. Boiss. ser.2.8:263.1908.
Shrubs, ca 1.5 cm high. Leaves obovate, spinulose, serrate, fascicled. Flowers yellow.
Himtol, 73488.

PODOPHYLLACEAE

Podophyllum hexandrum Wall. ex Royle, III. Bot. Himal. 64.1834.
Herbs, 30-50 cm high, 2-leaved. Leaves lobed. Flowers pinkish-white, Fruits red.
Dharansi, 73461.

PAPAVERACEAE

Meconopsis aculeata Royle, III. Bot. Himal. 67.t.15.1833.
Prickly herbs, 30-50 cm high. Flowers blue.
Dharansi, Ramani to Bhujgara, 73327.

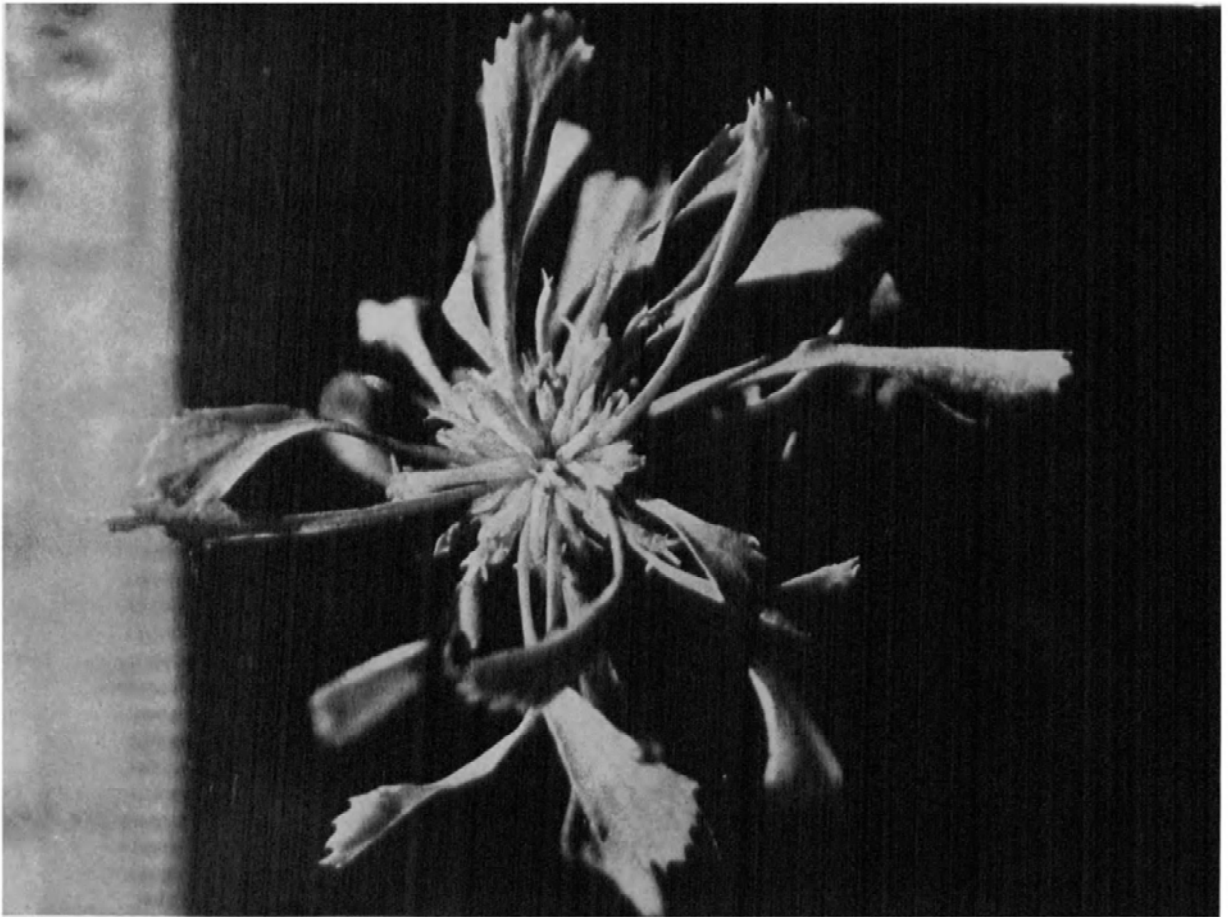


Plate 7. *Circaeaster agrestis* Maxim.

FUMARIACEAE

Corydalis casimiriana Duthie ex Prain in Journ. As. Soc. Beng. 165:27.1897.
Herbs, ca 35-40 cm high. Flowers yellow with purple tip.
Deodi to Dibrugheta, 73400.

Corydalis crithmifolia Royle, Ill. 68.1834.
Herbs, with fusiform root, 5-20 cm high. Leaves radical 2-3 pinnatisect, segments linear and entire. Scape many flowered. Flowers greenish-yellow.
Latakharak to Dharansi, 73540; Sarasaupatal, 73907.

Corydalis stracheyi Duthie ex Prain in Journ. As. Soc. Beng. 65(2) 1896.
Spreading herbs. Flowers yellow.
Dharansi pass, 73454.

Corydalis thyrsoflora Prain in Journ. As. Soc. Beng. 65(2):35. 1896.
Herbs, ca 30 high. Flowers yellow with purple tips.
Ramani to Bhujgara, 73315; Dharansi, 73426.

BRASSICACEAE

Arabidopsis himalaica (Edgew.) O.E. Schulz. Pflanzenr. Heft. 86, (4-105), 283.1924.
Herbs, 25-35 cm high, hirsute. Leaves toothed.
Flowers purplish-white.
On way to Deodi from Dibrugheta, 73253.

Arabidopsis thaliana (L.) Heynh. in Holl. & Heynh. Fl. Sachs. 2:538. 1842.
Slender herbs, 2.5-10.0 cm high. Leaves obovate.
Flowers white.
Deodi to Dibrugheta, 73402.

Capsella bursapastoris (L.) Medic. Pflanzengatt. 85. 1792.
Herbs, ca 50 cm high. Leaves pinnatifid. Pod obcordate, laterally compressed.
Dharansi, 73473.

VIOLACEAE

Viola biflora L. Sp. Pl. 936. 1753.
Decumbent herbs. Leaves reniform. Flowers yellow.
On way to Ramani from Deodi, 73288.

CARYOPHYLLACEAE

Arenaria ciliolata Edgew. et Hook.f. in Fl. Brit. Ind. 1:240.1874.
Laxly tufted herbs. Leaves fringed with long jointed hairs.
Flowers solitary, white.
Dharansi-Himtoli, 73475.

Arenaria festucoides Bth. in Royle, Ill. 81.t.21.f.3.1834.
Densely tufted herbs. Flowers cymose, white.
Near Himtoli, 73527.

Arenaria musciformis Wall. ex Edgew. & Hook.f. in Fl. Brit. Ind. 1:237.1874.
Densely tufted herbs. Leaves subulate, minutely ciliate.
Flowers solitary, white.
Sarsaupatal, 73914.

Silene gonosperma (Rupr.) Bocquet subsp. **himalayensis** (Rabrb.) Bocquet in Candollea 22:8.1967.
Erect herbs, 30-40 cm high. Flowers 1-3, nodding. Calyx inflated, brownish-green. Petals white.
On way to Bhujgara from Ramani, 73324.

Silene vulgaris (Moench) Garcke, Fl. Nord. Mittel Deutschl. ed. 9:64.1869.
Herbs. Flowers erect, many. Calyx inflated, green petals creamy white.
Dibrugheta, 73269; Himtoli. 73504.

Thylacospermum caespitosum (Cambess.) Schischk, Herb. Fl. Ross. 9:90.1932.
Densely tufted herbs forming hemispheric cushions. Leaves minute. Flowers solitary, sessile, white.
Sarsaupatal, 73728.

HYPERICACEAE

Hypericum oblongifolium Choisy, Prodr. Hyp. 42,t.4.1821.
Shrubs, ca 1.0 m high. Leaves sessile, elliptic, glaucous beneath.
Flowers yellow. Stamens in 5 bundles.
Sonnwara to Pangrani, 73767.

GERANIACEAE

Geranium donianum Sweet, Geran. 4:sub. 338.1827.
Herbs, 10-20 cm high, pubescent. Leaves 5-lobed.
Flowers purplish.
Sarsaupatal, 73916.

Geranium robertianum L. Sp. Pl. 681.1753.
Herbs, ca 30 cm high, pubescent. Leaves 5-foliolate, segments
incised. Flowers purplish.
Dibrugheta to Sonnwara, 73777.

Geranium rotundifolium L. Sp. Pl. 683.1753.
Herbs with spreading branches. Leaves reniform, 7-lobed.
Flowers purplish.
On way to Bhujgara from Ramani, 73349.

Geranium wallichianum D. Don ex Sweet, Geran. 1, t.90.
1821.
Herbs with spreading branches. Leaves rhomboid 3-5 lobed.
Stipules large. Flowers purple.
Dibrugheta. 73226.

BALSAMINACEAE

Impatiens sulcata Wall. in Roxb. Fl. Ind. 2:458.1824.
Herbs, ca 1.0 m high. Flowers purple.
Dibrugheta, 73414.

Impatiens thomsonii Hook.f. in Journ. Linn. Soc. 4:128.1859.
Herbs, 10-12 cm high. Flowers white.
Himtoli, 73526.

CELASTRACEAE

Euonymus fimbriatus Wall. ex Roxb. Fl. Ind. 2:408.1824.
Tree, ca 8.0 m high. Leaves biserrate. Flowers green.
Fruits with 4 wings.
Himtoli, 73569; Dibrugheta to Sonnwara, 73746.

RHAMNACEAE

Rhamnus virgatus Roxb. Fl. Ind. 2:351.1824.
Shrub, ca 3.0 m high, spiny. Flowers in axillary
fascicles. Fruits obovate.
Dibrugheta to Sonnwara, 73779.

VITACEAE

Parthenocissus himalayana (Royle) Planch. in DC. Monogr.
Phan. 5:450.1887.
Climber. Stem robust. Leaflets-3. Flowers greenish-white.
Dibrugheta to Sonnwara, 73740.

ACERACEAE

Acer acuminatum Wall. ex D. Don, Prodr. 249.1825.
Tree, ca 10 m high. Leaves 5-lobed, with 5 basal nerves.
Flowers green. Fruits winged.
Himtoli, 73516. 73568; on way to Sonnwara from Dibrugheta,
73737.

ANACARDIACEAE

Rhus punjabensis Stewart ex Brandis, For. Fl. 120.1874.
Tree, ca 10.0 m high. Leaves pinnate, leaflets entire, sessile,
pubescent. Flowers white.
Pangrani, 73760.

CORIARIACEAE

Coriaria nepalensis Wall. Pl. As. Rar. 3:67.t.289.1832.
Shrubs, ca 3.5 m high. Leaves opposite, elliptic.
Flowers in axillary raceme. Fruits red.
Dibrugheta Sonnwara, 73773.

FABACEAE

Astragalus chlorostachys Lindl. in Trans. Hort. Soc. 7:249.
Undershrubs, ca 1.5 m high. Leaflets 13-17, oblong.
Flowers purplish green.
Himtolli, 73489.

Astragalus himalayanus Klotzsch in Klotzsch and Garcke Bot. Ergeb. Reise Waldemar 160.1862.
Stem slender, weak. Leaflets 11-25, oblong, hairy.
Flowers purplish.
On way to Ramani from Deodi, 73375.

Indigofera hebeptala Benth. ex Baker in Fl. Brit. Ind. 2:101.1876.
Shrubs, ca 2.0 m high, much branched. Branches and leaves hairy. Flowers purple.
Sonnwara to Pangrani, 73738.

Oxytropis lapponica (Wall.) Gay, Flora 10:30.1827.
Spreading herbs. Leaflets 13-17, hairy. Flowers in dense heads, purplish.
On way to Bhujgara from Ramani, 73347.

Piptanthus nepalensis (Hook.) D. Don in Sweet, Br. Fl. G. 3:t.264.1828.
Shrubs, 1.5-2.0 m high. Leaves 3-foliolate. Flowers yellow.
Dibrugheta-Deodi, 73261, 73592; Himtolli, 73576.

Thermopsis barbata Royle, Ill. Bot. Himal. 196.t. 32.8.1.1834.
Herbs, 25-35 cm high. Leaves 3-foliolate. Flowers deep purple. Himtolli, 73279, 73558.

ROSACEAE

Cotoneaster microphyllus Wall. ex Lindl. Bot. Reg. 13:t. 1114.1827.
Shrubs, much branched. Leaves obovate, retuse, glossy above. Flowers solitary.
Dibrugheta, 73410; Himtolli, 73573.

Cotoneaster integrifolius (Roxb.) Klotz. in Wiss. Z.Univ. Halle Math. 12:779.1963.
Shrubs, much branched. Leaves elliptic, acute, mucronate, glossy above, pubescent beneath. Flowers solitary.
Himtolli, 73518.

Cotoneaster affinis Lindl. in Trans. Linn. Soc. 13:101.1821.
Tree, ca 4.0 m high. Leaves densely tomentose beneath. Inflorescence 2-6 flowered, tomentose.
Sonnwara to Pangrani, 73761.

Fragaria nubicola Lindl. ex Lacaita in Journ. Linn. Soc. Bot. 43:467.1916.
Semierect herbs. Leaflets sessile, many toothed, silvery. Flowers white.
Himtolli, 73572.

Potentilla argyrophylla Wall. ex Lehm. Pugill. 3:35.1831.
var. **argyrophylla**
Herbs, ca 50 cm high. Flowers yellow.
Dharansi, 73468; Latakharak, 73539; Patakhana-Sarsaupatal, 73795.

Potentilla argyrophylla Wall. ex Lehm. var. **atrosanguinea** (Lodd.) Hook.f. in Fl. Brit. Ind. 2:357.1878.
Herbs, ca 70 cm high. Flowers deep purple.
Dibrugheta, 73273; Dharansi, 73467.

Potentilla cuneata Wall. ex Lehm. Pugill. 3:34.1831.
Tufted herbs. Leaflets 3-fid. Flowers solitary, peduncled, yellow.
Ramani, 73358.

Potentilla eriocarpa Wall. ex Lehm. Pugill. 3:35.1831.
Herbs with stout root stock. Stem slender, suberect.
Leaflets 3-multifid. Flowers solitary, peduncled,
yellow.
Ramani, 73335.

Potentilla fruticosa L. var. **rigida** (Wall. ex Lehm.)
Wolf, Monogr. Pot. 57. 1908.
Prostrate, undershrubs, much branched. Leaflets elliptic,
entire, apiculate. Flowers solitary, yellow.
On way to Deodi from Dibrugheta, 73259.

Potentilla microphylla D. Don, Prodr. Fl. Nep. 231:1825.
Densely tufted herbs. Leaflets many, minute. Flowers yellow.
Dharansi, 73786.

Rosa macrophylla Lindl. Monogr. Rosa 35.t.6.1820
Shrubs, prickly, ca 2.0 m high prickles straight.
Flowers solitary, red. Sepals long, persistent in fruit.
Deodi, 73289.

Rosa sericea Lindl. Monogr. Rosa 105.t.12.1820.
Spreading shrubs, ca 6.0 m high. Prickles compressed.
Flowers solitary, white. Sepals persistent in fruit.
Dibrugheta 73213; On way to Deodi from Dibrugheta, 73264;
Himtoli, 73499.

Rubus foliolosus D. Don, Prodr. Fl. Nep. 256.1825.
Spreading shrubs, prickly. Leaflets-3. Flowers pink.
Himtoli, 73487.

Sibbaldia purpurea Royle, Ill. Bot. Him. t.40.f.3.1834.
Procumbent branching, herbs. Leaflets 5, sessile, hairy.
Flowers purple.
Dharansi, 73543.

Sibbaldia tetrandra Bunge, Enum. Pl. Altaica 17.1835.
Densely tufted herbs. Leaflets 3-fid, silky.
Flowers yellow.
On way to Patakhana from Bhujgara, 73978.

Sorbus foliolosa (Wall.) Spach. Hist. Nat. Veg. 2:96.1834.
Shrubs ca 6.0 m high. Leaves and inflorescence with red brown
tomentum. Flowers crowded, pinkish-white.
Dibrugheta, 73216.

Spiraea bella Sims. in Bot. Mag. 59.t.2426.1823.
Shrubs, ca 1.5 m high. Leaves serrate. Flowers pink.
Himtoli, 73589.

Spiraea canescens D. Don, Prodr. Fl. Nep. 227.1825.
Shrub, ca 2.0 m high. Leaves quite entire. Flowers white.
Pangrani, 73781.

SAXIFRAGACEAE

Bergenia stracheyi (Hook.f. & Thoms.) Engl. in Bot. Zeit.
26:842.1868.
Herb. Rootstock stout. Leaves obovate, glabrous.
Flowers white.
Dharansi, 73564.

Saxifraga asarifolia Sternb. Rev. Saxifr. Suppl. 2:33.24.1831.
Herbs, ca 30 cm high. Flowers white.
Ramani to Bhujgara, 73333.

Saxifraga brachypoda D. Don var. **fimbriata** (DC.) Engl.
Irmsch in Bot. Jahrb. 48:591.1912.
Herbs, 15-20 cm high. Stem althrough leafy, 1-flowered.
Flowers yellow.
On way to Deodi from Dibrugheta, 73244.

Saxifraga brunonis Wall. ex Ser. in DC. Prodr. 4:45.1830.
Herbs, 4-6 cm high. Leaves rosulate with thread like structure. Flowers solitary, terminal, yellow.
On way to Ramani from Deodi, 73295.

Saxifraga diversifolia Wall. ex Ser. in DC. Prodr. 4:44.1830.
Herbs, 10-20 cm. high. Cauline Leaves sessile, amplexicaule. Flowers terminal, 1-3, yellow.
On way to Deodi from Dibrugheta, 73250; Dharansi, 73439.

Saxifraga filicaulis Wall. ex Ser. in DC. Prodr. 4:46.1830.
Herbs, ca 15 cm high, stem much branched, glandular hairy. Branches 1-flowered. Flowers yellow.
On way to Ramani from Deodi, 73377.

Saxifraga granulifera H. Smith in Bull. Br. Mus. (Nat. Hist.) B.2.259.t.21.B. 1960.
Herbs, 15-20 cm high. Leaves palmately 4-6-lobed. Flowers terminal, white.
On way to Deodi from Dibrugheta, 73397; Dharansi, 73530.

Saxifraga saginoides Hook.f. et Thoms. in Journ. Linn. Soc. 268.1858.
Herbs, 1.5-2.0 cm high. Leaves imbricate. Flowers yellow.
Dharansi, 73531.

PARNASSIACEAE

Parnassia nubicola Wall. ex Royle, Ill. Bot. Himal. 227. t.50.1835.
Herbs, ca 30 cm high. Scape 1-flowered. Flowers white.
Dibrugheta, 73270.

GROSSULARIACEAE

Ribes himalense Royle ex Decne. in Jacquem. Voy. 4(Bot.) 66.1835.
Shrubs, ca 3.0 m high. Flowers in pendulous raceme, yellowish.
On way to Ramani near Trisuligar River, 73286; Dibrugheta to Sonnwara, 73744.

HYDRANGEACEAE

Deutzia compacta Craib in Kew Bull. 1913:264.1913.
Shrubs, ca 2.0 m high, branches opposite, spreading. Inflorescence many flowered. Flowers white.
Sonnwara to Pangrani, 73741.

Philadelphus tomentosus Wall. ex G. Don, Gen. Syst. 2:807.1832.
Shrubs, ca 2.0 m high, branches opposite, spreading. Inflorescence few flowered. Flowers white.
Dibrugheta to Sonnwara, 73727.

CRASSULACEAE

Rhodiola crenulata (Hook. f. & Thoms.) H. Ohba in J. Jap. Bot. 51:386.1976.
Herbs, 15-20 cm high. Leaves sessile, crenulate. Flowers purplish.
Dharansi, 73451.

Rhodiola heterodonta (Hook. f. & Thoms.) A.Boriss. in Fl. U.S.S.R. 9:32.1939.
Herbs., 40-60 cm high. Leaf base auriculate. Flowers dense, purplish.
Dibrugheta, 73221; Deodi-Ramani, 73301.

Rhodiola quadrifida (Pallas) Fischer et Meyer, Enum. Pl. Nov. 1:69.1841.
Herbs, ca 5.0 m high, stems many. Flowers red.
Dharansi, 73460; on way to Sonnwara from Dibrugheta, 73751; On way to Patakhhan from Bhujgara, 73799.

Rhodiola sinuata (Royle ex Edgew.) Fu in Act. Phytotax. Sin. Addit. 1:127.1965.
Herbs, 10-20 cm high. Leaves sinuate, pinnatifid. Flowers white.
Dibrugheta, 73219, 73220, on way to Deodi from Dibrugheta, 73409.

Rhodiola wallichiana (Hook.f.) Fu in Acta Phyt. Sin. Addit. 1:125.1965.
Herbs, 20-25 cm high, rootstock thick, stems many. Flowers dense, yellow.
On way to Deodi from Dibrugheta, 73408.

Sedum multicaule Wall. ex Lindl. Bot. Register Misc. 26:58.1840.
Herbs, 7-10 cm high, branches many from the base. Flowers yellow.
Dharansi, 73458.

Sedum trullipetalum Hook. f. & Thoms. in Journ. Linn. Soc. 2:102.1858.
Herbs, 5-10 cm high. Cauline leaves imbricate. Flowers yellow.
On way to Ramani from Trisuligar River, 73000.

ONAGRACEAE

Circaea alpina L. Sp. Pl. 9:1753.
Herbs, 5-10 cm high. Leaves ovate. Flowers in terminal racemes, white.
On way to Ramani from Deodi, 73292.

Epilobium latifolium L. Sp. Pl. 347.1753.
Herbs, 50-70 cm high. Leaves oblong. Flowers purple.
On way to Ramani from Deodi near Trishuligar River, 73298.

Epilobium roseum (Schreb.) Pers. Syn. 1:410.1805.
Herbs, 25-60 cm high. Leaves shortly petioled. Flowers pink.
Ramani, 73336, 73365, Dharansi, 73441.

APIACEAE

Acronema tenera (DC.) Edgew. in Trans. Linn. Soc. 20:51. 1846.
Semierect, tuberous herbs, 15-25 cm high. Fruits ovate-oblong, narrowed upwards, green.
Ramani to Bhujgara, 73363.

Bunium persicum (Boiss.) Fedts. Rastit. Turkestan. 612. 1915.
Erect herbs, 10-50 cm high. Umbels lateral and terminal. Flowers white.
On way to Ramani from Deodi 73376.

Bupleurum marginatum Wall. ex DC. Prodr. 4:132.1830, 233.1835.
Herbs, ca 40 cm high, Leaves entire. Fruits green, with purplish tip.
Ramani to Deodi, 73374; Himtoli, 73514.

Chaerophyllum reflexum Lindl. in Royle, III. Bot. Himal. 233.1835.
Herbs, ca 1.0 m high. Rays 6. Fruits oblong, green.
Himtoli, 73503.

Chamaescidium garhwalicum (Wolff) Norman, Journ. Bot. 76:232.1938.
Stemless herbs, 10-20 cm high. Umbels terminal. Rays ca 15. Fruits green.
Dharansi, 73431.

Eriocyclus thomsonii (Clarke) Wolff in Engl. Pflanzenr. 90:106.1927.
Stem with many lateral branches and umbels. Rays 4-8. Petals white.
Sarasaupatal 73578.

Pleurospermum angelicoides (DC.) Clarke in Hook. f. Fl. Brit. Ind. 2:703.1897.
Herbs, 1.0-1.5 m high. Rays 10-30. Fruits oblong-elliptic, green.
Dibrugheta, 73235; Himtoli, 73512.

Pleurospermum densiflorum (Lindl.) Clarke in Hook. f. Fl. Brit. Ind. 2:706.1879.
Herbs, 10-25 cm high. Rays 8-12. Fruits ellipsoid.
Dharansi, 73444.

Pleurospermum stylosum Clarke in Hook. f. Fl. Brit. Ind. 2:704.1879.
Herbs, ca 70 cm high. Rays 10-35. Flowers white.
Fruits longer than broad.
Himtoli, 73510.

Selinum candollii DC. Prodr. 4:165.1830.
Herbs, ca 1.0 m high. Rays 20-30. Flowers white.
Fruits elliptic.
On way to Ramani from Deodi, 73367.

Selinum elatum (Edgew.) Hiroe, Umbel. Asia. 154.1958.
Stem fistular, pubescent. Umbels terminal and leaf-opposed.
Rays 20, unequal. Fruits dorsally compressed.
Dibrugheta, 73236.

Selinum vaginatum Clarke in Hook. f. Fl. Brit. Ind. 2:700.1879.
Herbs 20-70 cm high. Rays 15-30, unequal, pubescent.
Flowers white. Fruits oblong.
Himtoli 73517.

Seseli sibiricum (L.) Boiss. Fl. Or. 2:967.1872.
Plants ca 1.0 m high, pubescent. Umbels terminal and lateral. Rays ca 30, unequal. Fruits densely villous.
Himtoli, 73501.

ARALIACEAE

Acanthopanax cissifolius (Griff. ex Seem.) Harms in Engl. Pflfam. III-8:50.1897.
Prickly shrubs, ca 2.5 m high. Leaves digitate. Flowers in umbels, greenish-yellow.
Dibrugheta to Sonnwara, 73714.

Hedera nepalensis K. Koch, H. Dendr. 284.1853.
Climbing shrubs. Leaves very variable. Flowers green.
Dibrugheta Sonnwara, 73581.

CORNACEAE

Swida macrophylla (Wall.) Soiak in Nov. B. H. B. Univ. Carol. Prag. 1960:10.1960. *Cornus macrophylla* Wall.
Tree, ca 15.0 m high. Flowers in branched cyme, white.
Sonnwara to Pangrani, 73764.

CAPRIFOLIACEAE

Leycesteria formosa Wall. in Roxb. Fl. Ind. 2:181.1824.
Shrubs, ca 2.0 m high. Bracts leafy. Flowers white.
Rishiganga river bank, 73745.

Lonicera obovata Royle ex Hook. f. & Thoms. in Journ. L. Soc. 2:169.1858.
Shrubs, ca 1.5 m high. Leaves obovate. Flowers creamy white.
Ramani to Bhujgara, 73357, 73937; Dharansi, 73421.

Lonicera spinosa (Decne.) Jacq. ex Walp. Rep. Bot. 2:449. 1848.
Shrubs, densely branched ca 1.0 m high. Flowers white with pinkish tinge.
Sarsaupatal, 73901.

Lonicera webbiana Wall. ex DC. Prodr. 4:336.1830.
Shrubs, 5.0 m high. Leaves oblong lanceolate.
Flowers in pairs, yellowish with pinkish tinge.
Dharansi-Dibrugheta, 73215.

Triosteum hirsutum Wall. in Roxb. Fl. Ind. 2:180.1824.
Herbs, ca 1.0 m high. Leaves opposite, connate.
Flowers whorled, greenish outside, purple inside.
Fruits ellipsoid. (Fig. 1)
Himtoli, 73203.

Viburnum cotinifolium D. Don, Prodr. Fl. Nep. 141. 1825.
Shrubs, ca 4.0 m high. Leaves sub-orbicular, pubescent.
Flowers white with pink tinge. Fruits oblong, red black.
On way to Deodi from Dibrugheta, 73260.

Viburnum erubescens Wall. Pl. As. Rar. 2.29.t.134.1831.
Shrubs, ca 5.0 m high. Leaves elliptic oblong, glabrous above,
pubescent beneath. Flowers white with pink tinge. Fruits ellipsoid,
red.
Dibrugheta, 73214.

RUBIACEAE

Galium acutum Edgew. in Trans. L. Soc. 20:61.1846.
Scandent herbs. Leaves very small, six in a whorl.
Flowers white.
Deodi-Dibrugheta, 73389.

Galium aparine L. Sp. Pl. 108.1753.
Twiner. Leaves 6-8 in a whorl, linear, mucronate. Fruits with
hooked hairs.
Himtohi, 73505.

VALERIANACEAE

Nardostachys grandiflora DC. Prodr. 4:624.1830.
Herbs, 20-30 cm high. Rootstock stout covered with fibres.
Leaves spatulate. Flowers pinkish. (Fig. 2B)
Ramani to Bhujgara, 73326.

Valeriana hardwickii Wall. in Roxb. Fl. Ind. ed. 1.166.1820.
Herbs, ca 50 cm high. Leaves pinnate. Inflorescence dichoto-
mously branched. Flowers pinkish white.
Deodi to Dibrugheta 73385.

Valeriana dioica L. Sp. Pl. 31.1753.
Herbs, 10-30 cm high. Radical leaves entire, cauline, pinnatifid.
Inflorescence compact. Flowers pinkish-white.
Dharansi, 73457.

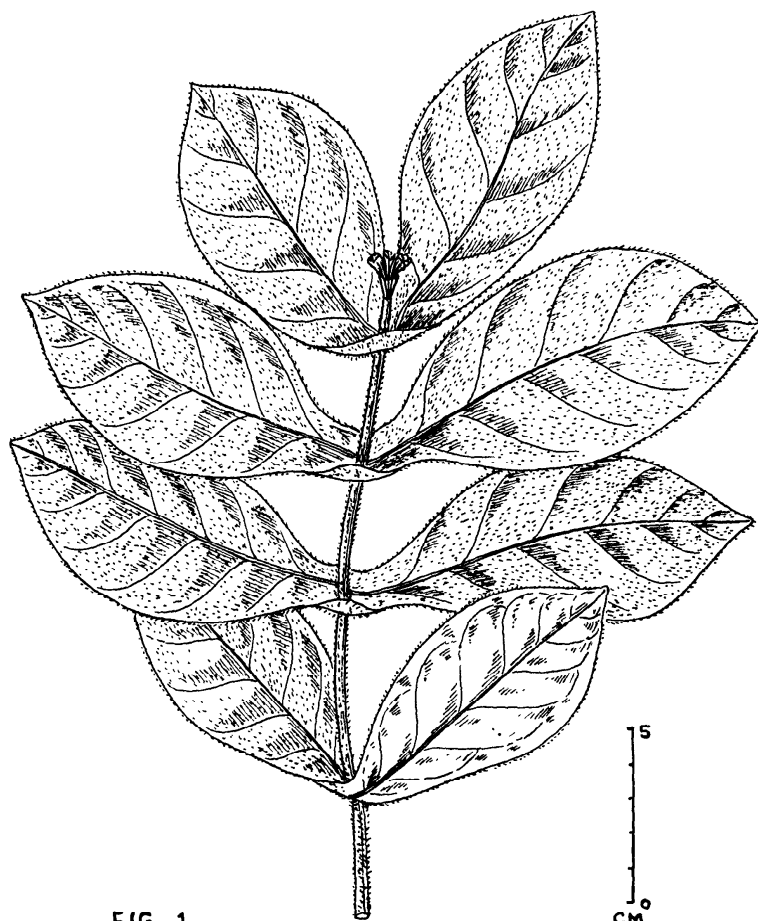


FIG 1

Triosteum hirsutum Wall.

DIPSACACEAE

Morina longifolia Wall. ex DC. Prodr. 4:644.1830.
Herbs, *ca* 50 cm high. Leaves spinous-toothed. Flowers pink.
Dibrugheta, 73268.

ASTERACEAE

Anaphalis contorta (D. Don) Hook. f. Fl. Brit. Ind. 3:284. 1881.
Herbs, 15-20 cm high. Leaves linear, amplexicaule at base, margin recurved. Heads small, in dense clusters, white.
Dibrugheta, 73233.

Anaphalis nepalensis (Spreng.) Hand. Mazz.-Symb. Sin. 1099. 1936.
Herbs, 10-30 cm high. Leaves elliptic or lanceolate. Heads large, lax, spreading, white, usually solitary.
Dharansi, 73463.

Anaphalis royleana DC. Prodr. 6:272.1838.
Herbs, *ca* 30 cm high. Stems many from the root. Leaves linear-oblong. Heads spreading, white.
Dibrugheta to Deodi, 73249.

Artemisia maritima L. Sp. Pl. 846.1753.
Herbs, *ca* 70 cm high, aromatic. Stems branched from base. Heads crowded, green.
Himtoli, 73508.

Artemisia roxburghiana Wall. ex Besser var. **grata** (Wall.) Hook. f. Fl. Brit. Ind. 3:326.1881.
Herbs, *ca* 50 cm high, aromatic. Leaf segments broad, white tomentose beneath.
Heads crowded, green.
On way to Deodi from Dibrugheta, 73248.

Aster diplostephioides (DC.) Clarke, Comp. Ind. 45.1876.
Herbs, *ca* 40 cm high. Cauline leaves sessile. Heads solitary. Ligule blue.
Dibrugheta, 73225.

Cirsium wallichii DC. Prodr. 6:643.1838.
Herbs, *ca* 1.0 m high.
Leaves sessile, lobes spinescent. Heads solitary, bracts spinescent.
Dibrugheta, 73417.

Cremanthodium arnicoides (Wall. ex DC.) R. Good, in Journ. L. Soc. 48:1929.
Herbs, *ca* 1.0 m high. Involucral bracts 1-seriate.
Heads heterogamous, yellow, nodding.
Dibrugheta, 73281;
On way to Bhujgara from Ramani, 73325; Himtoli, 73520.

Dubyaea hispida (D. Don) DC. Prodr. 7:247.1838.
Herbs, hispid, *ca* 15 cm high. Heads nodding, clothed with black glandular hairs. Ligule yellow.
Dharansi, 73434A.

Erigeron multiradiatus (DC.) Benth. Gen. Pl. 2:281.1873.
Herbs, 30-40 cm high. Heads solitary. Ligule blue.
Dibrugheta, 73272; Himtoli, 73491.

Inula cuspidata (DC.) Clarke, Comp. Ind. 125.1876.
Undershubs, *ca* 1.0 m high. Heads in terminal corymbs, purplish.
Himtoli, 73495.

Jurinea himalaica R. R. Stewart in Fl. West Pak. 757.1972.
Stemless herbs. Leaves spreading, pinnatifid. Heads many, crowded, sessile, purple.
Dharansi, 73455.

Lactuca lessertiana (Wall. ex DC.) Clarke ssp. **dentata** Stebbins in Ind. For. Records Bot. 1(6):240.1939.
Herbs, *ca* 30 cm high. Leaves elongate oblanceolate, sinuate-toothed. Heads on long peduncles; involucral bracts hairy, black.
Dharansi, 73434.

Lactuca macrorrhiza (Royle) Hook. f. Fl. Brit. Ind. 3:408.1881.
Herbs, spreading, branched. Leaves pinnatifid or entire. Heads villous, ligules purple.
On way to Deodi from Dibrugheta, 73246.

Lactuca violaefolia (Decne.) Clarke, Comp. Ind. 269.1876.
Herbs, 40-60 cm high. Stems slender. Petiole of the lower leaves dilated at base. Heads few, purple.
Dibrugheta, 73227; Himtoli, 73502.

Leontopodium himalayanum DC. Prodr. 6:276.1838.
Herbs, 5-15 cm high. Heads in terminal clusters, woolly, yellow.
On way to Deodi, from Dibrugheta, 73245; Dharansi, 73443.

Ligularia sibirica (L. f.) Cass. in Dict. Sci. Nat. 26:401.1823.
Herbs, ca 1.0 m high. Heads many, in terminal drooping raceme.
Ligules yellow.
Dibrugheta, 73415.

Saussurea leontodontoides (DC.) Sch.-Bip. in Linnaea 19:330.1846. Stemless herbs. Leaves spreading, lobes toothed. Head solitary, sessile, purple.
On way to Bhujgara from Ramani, 73359.

Saussurea obvallata (DC.) Sch. Bip. in Linnaea 19:331.1846.
Herbs, ca 30-70 cm high. Heads enclosed in the membranous upper most leaves, purplish-green.
Dharnasi, 73464.

Senecio alatus Wall. ex DC. Prodr. 6:368.1838.
Herbs, ca 40 cm high. Leaves large, ovate-cordate, serrate. Petiole winged. Panicle ca 20 cm long. Heads yellow.
Himtoli, 73519.

Senecio chrysanthemoides DC. Prodr. 6:365.1838.
Herbs, ca 50 cm high. Lower leaves pinnatifid with auricled petioles.
Upper leaves sessile, amplexicaule. Heads yellow.
Dibrugheta, 73275; Himtoli, 73507.

Senecio graciliflorus DC. Prodr. 6:365.1838.
Herbs, ca 1.0 m high. Leaves, pinnatifid, long petioled. Heads yellow.
Dibrugheta, 73416.

Senecio kunthianus Wall. ex DC. Prodr. 6:369. 1838.
Herbs, ca 30 cm high. Leaves elliptic lanceolate, white tomentose beneath. Heads yellow.
Ramani-Bhujgara, 73319; Dharansi, 73480.

Senecio quinquelobus Hook. f. & Thoms. in Clarke Comp. Ind. 209. 1876.
Herbs, ca 70 cm high. Leaves lobed. Racemes 15-30 cm long. Heads yellow.
Himtoli, 73490.

Solidago virgaurea L. Sp. Pl. 880. 1753.
Herbs, ca 70 cm high. Heads 1-4 on short axillary peduncles, yellow.
Himtoli, 73494.

Tanacetum tomentosum DC. Prodr. 6:130. 1838.
Herbs, 10-15 cm high, aromatic, tomentose. Heads yellow.
Sarsaupatal, 73911.

Taraxacum officinale Webar in Wigg. Prin. Fl. Holsat. 56. 1780.
Scapigerous herbs. Leaves radical, pinnatifid. Heads solitary, yellow, homogamous.
Dharansi, 73478.

CAMPANULACEAE

Campanula colorata Wall. in Roxb. Fl. Ind. 2:98. 1824.
Herbs, 30-50 cm high. Leaves alternate, hairy. Flowers purple.
Himtoli, 73492.

Condonopsis rotundifolia Benth. in Royle, III. Bot. Himal. 254. t. 62. 1835.
Twiner. Leaves opposite, crenate, hairy. Flowers green.
Dibrugheta, 73234.

Cyananthus lobatus Wall. ex Benth. in Royle, III. Bot. Himal. 309. t. 63. fig. 1. 1835.
Herbs, 15-35 cm high. Leaves lobed. Calyx with black hairs. Corolla blue.
Dibrugheta, 73271; Dharansi, 73481.

Cyananthus microphyllus Edgew. in Trans. Linn. Soc. 20:81. 1836.

Herbs, 10-20 cm high. Leaves sessile, entire. Calyx with black hairs. Corolla blue.

On way to Dibrugetha from Deodi, 73398; Dharansi, 73482.

ERICACEAE

Cassiope fastigiata (Wall.) D. Don in Edinb. Phil. Journ. 17:158. 1834.

Shrubs, 8-20 cm high, tufted. Leaves imbricate. Flowers white. Ramani to Bhujgara, 73364; Pataalkhan, 73980.

Gaultheria trichophylla Royle, III. Bot. Himal. 260.t.63.f.3. 1835.

Prostrate undershrubs, hirsute. Flowers white.

Dibrugetha-Sonnwara, 73754.

Rhododendron anthopogon D. Don in Mem. Wern. Soc. 3:409. 1821.

Shrubs, ca 30 cm high. Leaves densely scaly beneath.

Flowers creamy.

Ramani to Bhujgara, 73320; Dharansi, 73939.

Rhododendron arboreum Sm. Exot. Bot. f. 6, 1804.

Trees, ca 6 m high. Leaves silvery or rusty tomentose beneath. Flowers red.

Dibrugetha to Sonnwara, 73600.

Rhododendron campanulatum D. Don in Mem. Wern. Soc. 3:410. 1821.

Large shrubs, 2-5 m high. Leaves cinnamomeous tomentose beneath. Flowers purple to bluish-white.

Himtolli, Latakharak, Dibrugetha, 73278, 73561, 73940.

Rhododendron lepidotum Wall. ex D. Don, Gard. Dict. 3:854. 1834.

Shrubs, 30-50 cm high. Leaves with scattered scales beneath. Flowers purple.

Dharansi to Dibrugetha 73211; Ramani to Bhujgara, 73360; Himtolli. 73588; Pataalkhan, 73979.

PRIMULACEAE

Androsace globifera Duby in DC. Prodr. 8:48. 1844.

Herbs. Stem very short, branches densely packed, forming spherical tufts. Leaves densely imbricate. Scape very short, 1-flowered.

Dharansi, 73785; Sarsaupatal, 73954.

Androsace sarmentosa Wall. in Roxb. Fl. Ind. 2:14. 1824.

Herbs. Stolons leafless except at the nodes. Leaves silky pubescent, sessile. Umbels lax. Flowers purplish.

On way to Ramani from Deodi, 73293.

Primula denticulata Sm. Exot. Bot. 2:109.t.114, 1805.

Herbs, 7-15 cm high. Leaves crowded at base. Scape stout, many flowered. Flowers purplish.

Lata Kharak, 73536; Sarsaupatal, 73918, 73956.

Primula macrophylla D. Don var. **moorcroftiana** (Wall.) Pax in Engl. Bot. Jahrb. 10:207. 1889.

Herbs, 15-30 cm high. Leaves crowded. Scape stout, 3-15 flowered. Flowers purple.

Dharansi, 73541, 73591; Sarsaupatal, 73955.

Primula minutissima Jacq. ex Duby in Mem. Soc. Phys. d. hist. nat. Geneve 10, t.1.f.3. 1873.

Herbs, densely tufted, very low. Leaves crowded. Scape usually 1-flowered. Flowers purple.

Dharansi, 73545; Sarsaupatal, 73961.

Primula munroi Lindl. in Bot. Reg. t.15. 1833.

Herbs, 10-20 cm high. Leaves long petioled. Scape 2-6 flowered, white with purple tinge.

Sarsaupatal, 73910.

OLEACEAE

Jasminum humile L. Sp. Pl. 7. 1753.

Erect shrubs, ca 2.5 m high. Leaves 3-5 foliolate. Flowers yellow. Dibrugetha, 73258.

Syringa emodi Wall. ex Royle, Ill. Bot. Himal. 267. t. 65. f.2. 1835.

Shrubs, ca 3.0 m high. Panicle dense-flowered. Flowers purplish. On way to Deodi from Dibrugheta, 73262.

ASCLEPIADACEAE

Cynanchum canescens (Willd.) K.Schum. in Pflanzenfam. 4(2):252.1895.

Herbs, ca 30 cm high. Flowers in sessile umbels, yellow. On way to Deodi from Dibrugheta, 73791.

GENTIANACEAE

Gentiana argentea (Royle ex D.Don) DC. Prodr. 9:107.1845. Herbs, 2-5 cm high. Cymes 3-flowered, blue.

On way to Deodi from Dibrugheta, 73712.

Gentiana capitata Buch.-Ham. ex D.Don, Prodr. Fl. Nepal. 12.1825.

Herbs, ca 3.0 cm high. Flowers crowded, blue. Dharansi, 73546.

Gentiana venusta Wall. ex Griseb. Gent. 276. 1836.

Stemless herbs. Leaves dense. Flowers tubular, blue. Dharansi, 73465.

Gentianella pedunculata Royle ex G.Don, Gen. Syst. 4:182. 1837.

Herbs, 6-10 cm high, erect or straggling. Flowers blue. On way to Bhujgara from Ramani, 73346.

Halenia elliptica D.Don in Trans. Linn. Soc.17:529.1837. Herbs, 30-40 cm high. Flowers in axillary cymes, bluish.

Dibrugheta, 73230; Dharansi, 73422.

Lomatogonium carinthiacum (Wolf.) A.Br. in Flora 1, 13:221.1830.

Herbs, ca 15 cm high, branched, straggling. Flowers solitary, long peduncled, blue.

On way to Bhujgara from Ramani, 73344.

Swertia ciliata (G.Don) B.L. Burt in Notes Roy. Bot. Gardn. Edinb. 26(3): 272. 1965.

Herbs, 15-60 cm high. Panicles leafy, many flowered. Flowers greenish-white, purple inside at base. Dibrugheta, 73232; Dharansi, 73437.

Swertia cuneata Wall. ex D.Don in Trans. Linn. Soc. 17:520. 1837.

Herbs, 10-20 cm high. Peduncles long, 1-flowered. Flowers blue. Dharansi, 73432.

BORAGINACEAE

Arnebia benthamii (Wall. ex G. Don) I.M.Johnston in Journ. Arnold Arbor. 35:56. 1954.

Hispid herbs, 50-75 cm high. Spike dense. Flowers purplish-white.

Himtoli, Trishuligar river bank on way to Ramani from Deodi, 73287, (Pl.8).

Arnebia euchroma (Royle) I. M. Johnston in Contrib. Herb. 73:49.t.47.f.2.1924.

Herbs, 10-20 cm high, hirsute. Flowers purplish, crowded at apex.

Sarsaupatal, 73903.

Hackelia uncinata (Benth.) C.E.C. Fischer in Kew. Bull. 1932. 298. 1932.

Herbs, ca 1.0 m high, hairy. Inflorescence lax. Flowers white. Sonnwara to Pangrani, 73743.

Myosotis sylvatica Hoffm. Deutsch. Fl. Od. Bot. Taschenb. 1:61.1791.

Hairy herbs, 30-40 cm high. Raceme lax-flowered. Flowers blue.

Dibrugheta, 73231; Dharansi, 73435.



Plate 8. *Arnebia benthami* (Wall, ex G. Don) Johnston.

CUSCUTACEAE

Cuscuta europea L. Sp. Pl. 124.1753.
Twiner, leafless. Flowers in sessile globose heads,
purplish white.
Dibrugheta, 73267; Himtoli, 73511.

SCROPHULARIACEAE

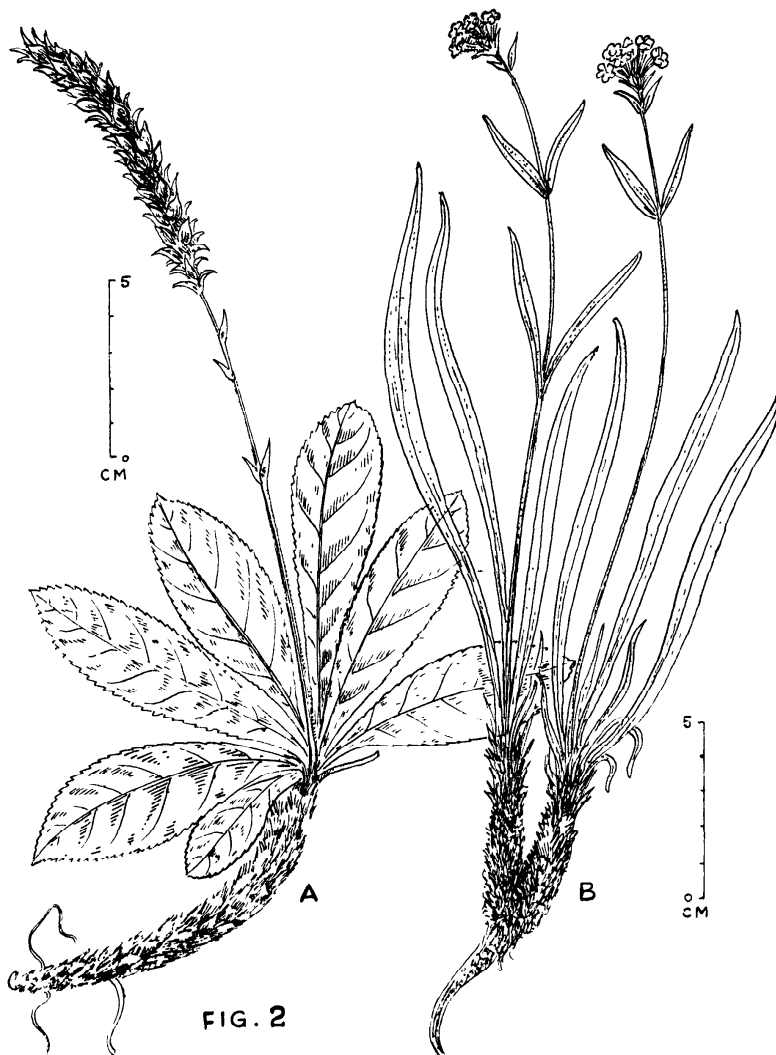
Euphrasia kurramensis Pennel, Scroph. W. Himal.
104.1943.
Herbs, 20-25 cm high. Flowers white.
Dibrugheta, 73266.

Picrorhiza kurroa Royle ex Benth. Scroph. Ind.
47:1835.
Herbs, ca 40 cm high. Rootstock clothed with leaf bases.
Leaves spatulate. Flowers bluish-white. (Fig. 2A).
Deodi on way to Ramani, 73386.

Scrophularia calycina Benth. Scroph. Ind. 18.1835.
Herbs, ca 60 cm high. Inflorescence dense-flowered
cymes, white.
Dharansi, 73462.

2A. *Picrorhiza kurroa* Royle ex Benth.

2B. *Nardostachys grandiflora* DC.



Scrophularia himalensis Royle ex Benth. Scroph. Ind. 18.1835.
Herbs, ca 50 cm high. Inflorescence lax-flowered cymes, green.
Dibrugheta, 73276.

Verbascum thapsus L. Sp. Pl. 177. 1753.
Herbs, 30-70 cm high, woolly. Flowers in terminal spikes, yellow.
On way to Dibrugheta from Deodi, 73383.

Veronica capitata Benth. Scroph. Ind. 45.1835.
Herbs, 5-15 cm high, pubescent. Leaves entire, shortly petioled.
Flowers in sessile heads, blue.
Sarsaupatal, 73928.

Veronica lanosa Royle ex Benth. Scroph. Ind. 45.1835.
Herbs, 5-10 cm high, pubescent. Leaves sessile, serrate. Flowers
lax, blue.
Dharansi, 73442.

OROBANCHACEAE

Orobanche alba Stephan in Willd. Sp. Pl. 3:350. 1800.
Herbs, 15-50 cm high, leafless. Spike lax-flowered. Flowers
purplish.
On way to Deodi from Dibrugheta, 73254; Himtoli, 73530.

Xylanche himalaica (Hook. f. & Thoms.) G.Beck in Monogr.
Orob. 58. 1890. in nota.
Herbs, 10-30 cm high, leafless. Flowers in dense spikes, yellowish.
On way to Dharansi from Himtoli, 73535.

LENTIBULARIACEAE

Pinguicula alpina L. Sp. Pl. 1:17. 1753.
Low herbs. Leaves radical. Scape 1-flowered. Flowers white,
yellow spotted.
On way to Bhujgara from Ramani, 73966.

LAMIACEAE

Ajuga parviflora Benth. in Wall Pl. As. Rar. 1:59. 1830.
Low herbs, branches many, diffuse, hairy. Leaves purple beneath.
Flowers in dense spikes, blue.
Sonnwara to Pangrani, 73759.

Clinopodium vulgare L. Sp. Pl. 587. 1753.
Herbs, 25-30 cm high, hairy. Flowers in dense whorls, purple.
On way to Deodi from Dibrugheta, 73296.

Elsholtzia eriostachya Benth. Lab. Gen. et. Sp. 163.
1832-1836.
Herbs, 10-40 cm high, strongly aromatic. Spike solitary, villous.
Flowers yellow.
Deodi to Dibrugheta, 73388.

Nepeta discolor Royle ex Benth. in Hook. Bot. Misc. 3:378.
1833.
Herbs, ca 50 cm high, aromatic; branches ascending. Spikes
cylindric, dense flowered. Flowers bluish.
On way to Deodi from Ramani, 73372.

Origanum vulgare L. Sp. Pl. 590. 1753.
Herbs, 40-60 cm high, aromatic. Flowers purplish white.
Dibrugheta, 73229; Himtoli, 73515.

Phlomis bracteosa Royle ex Benth. in Hook. Bot. Misc.
3:383. 1833.
Herbs, 30-50 cm high, pubescent. Leaves variable. Whorls
dense-flowered. Bracts ciliate. Flowers purplish.
Dibrugheta, 73274.

Thymus serpyllum L. subsp. **quinquecostatus** (Celak.)
Kitamura in Fauna Fl. Nep. Himal. 216. 1955.
Undershrubs, slender, much-branched, aromatic. Leaves small.
Flowers in dense cymes, purplish-white.
Sarsaupatal, 73931; Himtoli, 73586.

CHENOPODIACEAE

Chenopodium botrys L. Sp. Pl. 219. 1753.
Herbs, 20-30 cm high, aromatic, glandular pubescent.
Flowers minute, greenish.
Deodi-Ramani, 73369.

POLYGONACEAE

Aconogonum rumicifolium (Royle) Hara, Fl. East. Himal. 632.1966.
Herbs, ca 50 cm high. Leaves ovate-cordate. Flowers in terminal and axillary dense flowered panicles, green.
On way to Bhujgara from Ramani, 73322.

Fagopyrum dibotrys (D. Don) Hara, Fl. East. Himal. 68.1966.
Herbs, ca 30 cm high. Flowers in terminal and axillary cymes, white.
On way to Deodi from Dibrugheta, 73384.

Koenigia delicatula (Meissn.) Hara, Fl. East. Himal. 70. 1966.
Herbs, 5-10 cm high. Stem delicate, filiform. Leaves sessile, minute. Flowers minute.
Dharansi, 73459.

Oxyria digyna (L.) Hill. Hort. Kew. 158. 1769.
Herbs, 15-40 cm high. Radical leaves orbicular-cordate. Racemes lax flowered.
Dibrugheta to Deodi, 73265; Ramani to Bhujgara, 73328; Pataalkhan-Sarsaupatal, 73952.

Polygonum affine D. Don, Prodr. Fl. Nepal. 70. 1825.
Herbs, 20-30 cm high. Inflorescence dense flowered spikes. Flowers bright pink.
Dharansi, 73345; Sarsaupatal, 73908.

Polygonum nepalensis (Meissn.) H. Gross in Engl. Bot. Jahrb. 49:277. 1913.
Prostrate herbs. Flowers in heads, greenish-white.
Dibrugheta-Deodi, 73263.

Polygonum polystachyum Meissn. in Wall. Pl. As. Rar. 3:61. 1832.
Undershrubs, ca 1.5 m high. Flowers in large thyrsoid panicles, white.
On way to Ramani, Rishiganga river bank, 73340.

Polygonum vacciniifolium Wall. ex Meissn. in Wall. Pl. As. Rar. 3:54. 1832.
Undershrubs, prostrate, much branched. Flowers pink.
Ramani to Deodi, 73373.

Polygonum viviparum L. Sp. Pl. 360. 1753.
Herbs, 30-50 cm high. Flowers in terminal dense spikes, pink.
Dharansi, 73469.

Rumex acetosa L. Sp. Pl. 337. 1753.
Herbs, 50-70 cm high. Radical leaves long petioled, cauline sessile. Flowers pink.
Dharansi, 73471.

Rumex nepalensis Spreng. Syst. 2:159. 1825.
Herbs, ca 1.0 m high. Flowers in axillary distant whorls, pinkish.
Dharansi, 73472.

THYMELAEACEAE

Daphne papyracea Wall. ex Steud. emend. W. W. Sm. & Cave in Rec. Bot. Surv. Ind. 6:54. 1913.
Shrubs, ca 1.5 m high. Flowers in clusters, white.
Near Pangrani, 73760.

Stellera chamaejasme L. Amoen. Acad. 1:400.
Herbs, 15-30 cm high, branched from base. Flowers in sessile head, fragrant, pinkish-white.
Himtoli, 73559; Sarsaupatal, 73923.

SANTALACEAE

Thesium himalense Royle ex Edgew. in Trans. Linn. Soc. 20:88. 1846.
Procumbent herbs. Leaves linear. Flowers white.
Bhujgara, 73973.

EUPHORBIACEAE

Euphorbia pilosa L. Sp. Pl. 460. 1753.
Herbs, *ca* 70 cm high. Involucres yellowish green. Capsule warty.
Dibrugheta to Sonnwara, 73747.

Euphorbia stracheyi Boiss. in DC. Prodr. 15(2):114. 1864.
Prostrate herbs with long rootstock. Involucres greenish yellow.
Capsule smooth.
Dharansi, 73544; Sarsaupatal, 73920.

ULMACEAE

Celtis australis L. Sp. Pl. 1043. 1753.
Tree *ca* 20 m high. Leaves coarsely serrate, base unequal, caudate acuminate. Flowers greenish. Fruits purplish or black.
Sonnwara to Pangrani, 73763.

Ulmus wallichiana Planch. in Ann. Sci. nat. Ser. 3, 10:277. 1848.
Tree *ca* 20 m high. Fruit winged, orbicular.
Dibrugheta to Sonnwara, 73729.

URTICACEAE

Parietaria debilis Forst. Prodr. 387. 1786.
Diffuse herbs, 4-12 cm high. Flowers in cymose axillary clusters.
Dibrugheta to Deodi, 73304.

Urtica dioica L. Sp. Pl. 984. 1753.
Herbs with stinging hairs, *ca* 1.0 m high. Leaves ovate-cordate; stipules usually free. Flowers in axillary clusters.
Himtoli, 73509.

JUGLANDACEAE

Juglans regia L. Sp. Pl. 997. 1753.
Tree, *ca* 35 m high. Leaflets 5-9. Fruits globose, pubescent, green with pink tinge.
Pangrani, 73780.

BETULACEAE

Betula utilis D. Don, Prodr. Fl. Nep. 58. 1825.
Tree *ca* 15 m high. Leaves serrate, 7-9 nerved. Fruiting spikes *ca* 3.0 cm long.
Dibrugheta, 73212, Bhujgara, 73329; Himtoli, 73563.

SALICACEAE

Salix denticulata Anders., Svensk. Vet. Akad. Handl. 1850:481. 1851.
Shrubs, *ca* 1.5 m high. Fruiting catkins 4-5 cm long.
Himtoli, 73498, 73563.

Salix fruticulosa Anders. in Journ. Linn. Soc. 4:53. 1860.
Spreading shrubs. Fruiting catkins 1.0-2.0 cm long.
Dibrugheta to Sonnwara, 73750; Sarsaupatal, 73929.

Salix karelinii Turcz in Bull. Soc. Nat. Mosc. 27:196. 393. 1854.
Erect shrubs *ca* 1.5 m high, young shoots silky-hairy.
Catkins *ca* 5 cm long.
Ramani to Bhujgara, 73354; Sarsaupatal, 73932.

Salix lindleyana Wall. ex Anders. in Act. Holm. 499. 1850.
Deciduous shrubs. Stem creeping, producing annual erect shoots.
Inflorescence erect, few-flowered.
Ramani to Bhujgara, 73356; Sarsaupatal, 73926.

Salix wallichiana Anders. in Act. Holm. 447. 1850.
Tree *ca* 8 m high. Leaves elliptic-lanceolate.
Fruiting catkins 8-10 cm long. Capsules silky.
Sonnwara to Pangrani, 73735.

Monocotyledons

ORCHIDACEAE

Aorchis roborovskii (Maxim.) Sied. in Nord. Journ. Bot. 2:9. 1982.
Terrestrial herbs, 5-10 cm high. Leaf solitary.
Flowers purple. Lip trilobed.
Bhujgara to Patakhana, 73972.

Calanthe tricarinata Lindl. Gen. & Orch. 252. 1833.
 Terrestrial herbs, 30-50 cm high. Leaves 2-3, sessile.
 Flowers greenish purple (Pl. 9).
 Dibrugheta to Sonnwara, 73725.

Cypripedium elegans Reichb. f. Flora 69:561. 1886.
 Terrestrial herbs, 15-25 cm high, villous.
 Leaves two, opposite. Flowers solitary, purplish green (Fig. 3A).
 Dibrugheta to Deodi, 73237, 73789.

Cypripedium himalaicum Rolfe in J. Linn. Soc. 29. 319. 1893.
 Terrestrial herbs, 15-30 cm high. Leaves 3-4, alternate. Flowers 1-2,
 purplish green. (Pl. 10, & Fig. 3B).
 Dibrugheta-Deodi, 73238, 73788.

Dactylorhiza hataguirea (D. Don)Soo, Nom. Nov. Gen.
 Dact. 5:4. 1962.
 Terrestrial herbs, 25-30 cm high. Tubers palmate. Leaves many.
 Flowers purple, lip deep purple, spotted, spur stout.
 Himtoli. 73497.

Epipogium aphyllum (F. W. Schmidt) Sw. Summa Veget.
 Scand. 32. 1814.
 Terrestrial, leafless, 10-20 cm high herbs. Root coralloid.
 Flowers pinkish yellow, spotted.
 On way to Himtoli from Tolma village.



3A. *Cypripedium elegans* Reichb. f.
 3B. *Cypripedium himalaicum* Rolfe

FIG 3



Plate 9. *Calanthe tricarinata* Lindl.



Plate 10. *Cypripedium himalaicum* Rolfe amidst *Cotoneaster*.

Goodyera repens (L.) R. Br. in Aiton. Hort. Kew. ed. 2, 5:198. 1813.

Terrestrial herbs, 15-25 cm high. Leaves subradical, mottled. Flowers greenish-white.
On way to Himtoli from Tolma village., 73204.

Gymnadenia orchidis Lindl. Gen. & Sp. Orch. 278. 1835.
Terrestrial herbs, 30-50 cm high. Spike dense-flowered. Flowers purplish. Lip 3-lobed at apex; spur slender, incurved. Himtoli, 73280.

Herminium monorchis (L.) R. Br. in Aiton, Hort. Kew. ed. 2,5:191.1813.
Terrestrial, tuberous herbs. 10-15 cm high. Flowers yellowish-green. Lip 3-lobed.
Deodi to Dibrugheta, 73399.

Listera tenuis Lindl. J. Proc. Linn. Soc. Bot. 1:176.1857.
Terrestrial herbs, 12-15 cm high. Leaves two, sessile. Flowers green. Deodi to Ramani camp, 73294.

Malaxis muscifera (Lindl.) O. Ktze. Rev. Gen. 2:673.1891.
Terrestrial herbs, 20-30 cm high. Leaves two. Flowers minute, green.
On way to Himtoli from Tokma village, 73205.

Neottia listeroides Lindl. in Royle, III. Him. Bot. 368.1839.
Terrestrial leafless herbs, 10-30 cm high. Flowers yellowish-green, lip dark brown, bifid.
On way to Himtoli from Tolma, 73206.

Neottianthe secundiflora (Hook. f.) Schltr. Fed. Repert. 16:291.1919.
Terrestrial, 6-15 cm high herbs. Flowers secund, pink, all perianth except lip connivent to form a hood-like structure.
Himtoli to Dharansi, 73209; Dibrugheta to Deodi, 73239.

Oreorchis micrantha Lindl. Journ. Linn. Soc. 3:27.1859.
Terrestrial herbs, 20-30 cm high. Leaves 2, long, narrow. Flowers small, white. Lip purple dotted.
On way to Sonnwara from Dibrugheta, 73724.

Peristylus elisabethae (Duthie) Gupta in Fl. Nainitalen. 351:1968.

Terrestrial, tuberous, 10-20 cm high herbs. Flowers small, crowded, green.
Dibrugheta to Deodi, 73241.

HAEMODORACEAE

Aletris pauciflora (Klotzsch.) Hand.-Mazz., Symb. Sin. 7:1220.1936.

Herbs, 10-30 cm high. Flowers pinkish-white.
Ramani to Bhujgara, 73318; Sarsaupatal to Patakhan, 73964.

IRIDACEAE

Iris kumaonensis D. Don ex Royle, III. Bott. Himal. 1:372.1839.
Herbs, 15-30 cm high. Leaves linear. Flower lilac, mottled.
Latakharak to Dharansi, 73537.

DIOSCOREACEAE

Dioscorea deltoidea Wall. ex Kunth, Enum. 5:340.1850.
Twiner. Leaves ovate lanceolate, acuminate, base cordate. Male spikes very slender. Flowers solitary or clustered, greenish.
On way to Sonnwara from Dibrugheta, 73732.

LILIACEAE

Allium govanianum Wall. ex Baker in Journ. Bot. 293.1874.
Foetid, bulbous herbs, 15-25 cm high. Scales of the bulb of reticulated fibres. Leaves flat. Flowers white. Stamens shorter than the perianth.
Latakharak, 73538.

Allium stracheyi Baker, Journ. Bot. 12:293.1874.
Herbs, 25-30 cm high. Bulbs clustered. Leaves linear. Head dense-flowered. Flowers purplish-white. Stamens longer than the perianth.
Dibrugheta to Deodi, 73240; Himtoli, 73513; Sarasupatal, 73905.

Allium wallichii Kunth, Enum. 4.1843.

Herbs, 50-70 cm high. Bulbs clustered. Leaves ensiform, flat. Head lax-flowered. Flowers purple. Stamens equalling or shorter than the perianth.

Near Dharansi on way to Dibrugetha, 73420.

Lilium wallichianum J. A. & J. H. Schultes, Syst. Veg. 7(2): 1689.1830.

Herbs, ca 1.0 m high. Leaves sessile, Flowers solitary, fragrant, greenish-white, spotted.

Pangrani on way to Rani, 73783.

Lloydia serotina (L.) Reichb. Fl. Germ. Excurs. 102.1830.

Herbs, 8-20 cm high. Leaves filiform. Flowers solitary, white, with purple veins.

Latakharak to Dharansi, 73542, 73793; Sarsaupatal, 73917.

Nomocharis nana (Klotz.) E. H. Wilson in Lil. East Asia 13. 1925.

Herbs, 15-40 cm high. Leaves narrowly linear. Flowers bluish.

On way to Bhujgara from Ramani, 73348; Dibrugetha to Dharansi, 73792.

Nomocharis oxypetala (Royle) E. H. Wilson, Lil. East Asia 13:1925.

Herbs, 20-50 cm high. Leaves elliptic lanceolate. Flowers solitary, yellow.

Dibrugetha to Deodi, 73243; Himtoli, 73485; Himtoli, 73554.

Polygonatum cirrhifolium (Wall.) Royle, Ill. Bot. Himal. 1:380.1839.

Herbs, 25-35 cm high. Leaves whorled with circinate tips. Peduncles 2-flowered. Flowers purplish.

Ramani to Deodi, 73371.

Polygonatum graminifolium Hook.f. Ic. Pl. t.833.1871.

Herbs, 15-20 cm high. Leaves opposite, linear. Peduncles 2-flowered. Flowers purplish-white.

Himtoli 73549.

Smilacina purpurea Wall. Pl. Asiat. Rar. 2:38.t.144.1831.

Herbs, 30-70 cm high. Leaves 6-12, elliptic or oblong.

Flowers racemose, purplish.

Himtoli, 73528; Dibrugetha to Sonnwara, 73733.

Trillidium govonianum (D. Don) Kunth. Enum. Pl.5:120.1850.

Herbs, 15-35 cm high. Leaves 3. Flowers purple.

On way to Himtoli from Dharansi, 73557.

JUNCACEAE

Juncus concinus D. Don, Prodr. Fl. Nepal. 44.1825.

Herbs, 20-30 cm high, tufted. Leaves filiform. Flowers subsessile, white.

Deodi to Dibrugetha, 73395; Bhojgara, 73976.

Juncus himalensis Klotsch & Garcke in Klot. et Grac. Reise de, Waldemar 60.t.97.1862.

Herbs, 20-25 cm high. Leaves filiform. Cyme compound. Flowers brownish.

Dharansi, 73425; Bhojgara, 73975.

Juncus membranaceus Royle ex D. Don in Trans. Linn. Soc. 18:320.1840.

Herbs, 25-30 cm high. Leaves filiform. Flowers white, solitary, sessile.

Dharansi, 73440.

ARACEAE

Arisaema jacquemontii Blume in Rumph. 1:95.1836.

Leaves 2, leaflets 5. Spathe green, white striped.

Dibrugetha, 73418.

CYPERACEAE

Carex cardiolepis Nees in Wight, Contrib. Bot. Ind. 127.1834.

Herbs, ca 15 cm high. Leaves as long as stem. Spikes 3-5, cylindrical, brown.

Sarsaupatal, 73919.

Carex duthiei C. B. Clarke in Hook.f.Fl. Brit. Ind. 6:731.1894.
Herbs, ca 70 cm high. Leaves shorter than stems. Spikes dark brownish-green.
Ramani, 73338.

Carex inanis Kunth, Enum. Pl. 2:522. 1837.
Herbs, ca 10.0 cm high. Leaves longer than stem. Spikes brownish-green.
On way to Deodi, 73596.

Carex lehmanii Drejer, Symb. Caric. 13.pl. 2.1844.
Tufted herbs, 50-60 cm high. Spikes cylindric or oblong, brown.
Ramani to Bhujgara, 73311.

Carex nivalis Boott in Trans. Linn. Soc. 2:136.1846.
Herbs, 50-100 cm high. Spikes few, dark brown or black.
On way to Bhujgara from Ramani, 73303.

Carex nubigena D. Don in Trans. Linn. Soc. Lond. 14:326.1824.
Tufted herbs, 30-40 cm high. Spike compound, greenish.
On way to Deodi from Dibrugheta, 73390.

Carex obscura Nees in Wight, Contrib. Ind. 126.1834.
Herbs, ca 20.0 cm high. Leaves longer than stem. Spikes close brownish-green.
Himtohi, 73548.

Carex setosa Boott, Illustr. 3:108.327-29.1862.
Herbs, ca 30 cm high. Leaves about half of the stem. Spikes 2-3, slender, brown.
On way to Deodi from Dibrugheta, 73595.

Cyperus cuspidatus Kunth in Humb. Bonpl. & Kunth, Nov. Gen. Sp. 1:204.1816.
Low herbs, 1-5 cm high. Spikelets clustered, compressed, brownish-green.
On way to Dibrugheta from Deodi, 73403.

Kobresia capillifolia (Dcne.) C. B. Clarke in Journ. Linn. Soc. Bot. 20:378.1884.

Tufted herbs, 30-50 cm high. Leaves linear-setaceous. Spikes linear, brown.
On way to Bhujgara from Ramani, 73312; Dharansi, 73449.

Kobresia deasyi C. B. Clarke in Kew Bull. 1908:68.1908.
Tufted herbs, 30-40 cm high. Spikes oblong, brown
Dharansi, 73427.

Kobresia laxa Nees in Wight, Contrib. Bot. Ind.
Herbs, ca 30 cm high. Leaves as long as stem. Spikes brown.
Dibrugheta-Sonnwara, 73730.

Kobresia nepalensis (Nees) Kukenth. in Engl. Pflanzenr. 4(20). Heft 38:40.1909.
Tufted low herbs. Spikes brownish.
Ramani to Bhujgara—73302; Dibrugheta to Sonnwara, 73752; Sarsaupatal, 73943.

POACEAE

Agrostis canina L. Sp. Pl. 62.1753.
Herbs, 10-15 cm high. Leaves narrow. Panicle loose, spikelets purplish.
Dharansi, 73446.

Agrostis pilosula Trin. var. **royleana** (Trin.) Bor in Kew Bull. 1954.459.1954.
Herbs, 30-40 cm high. Panicles interrupted. Spikelets purple.
Ramani-Bhujgara, 73306.

Andropogon munroi C. B. Clarke in Journ. Linn. Soc. Bot. 25.87.t.37.1889.
Herbs, ca 70.0 cm high. Inflorescence of three racemes.
Himtohi, 73321.

Bromus japonicus Thunb. var. **japonicus** Bor. Grass. India, Burma, Ceylon & Pakistan 455.1960.
Herbs, ca 40 cm high. Panicle more or less spreading, with drooping branches. Awn flexuous.
Dharansi, 73436.

Bromus ramosus Huds. Fl. Angl. 40.1762.
Herbs, *ca* 1.0 m high. Inflorescence a panicle, green, awn half the length of the lemma.
Ramani to Deodi, 73378.

Calamagrostis emodensis Griseb. in Goett. Nachr. 80.1868.
Herbs, *ca* 1.0 m high. Panicle *ca* 20 cm long, plume-like. Spikelets green.
Dibrugheta to Deodi, 73381.

Dactylis glomerata L. Sp. Pl. ed. 1.71.1753. subsp. **himalayensis** Domin in Act. Bot. Bohem. 14:129.1943.
Tufted herbs, 50-60 cm high. Spikelets in dense clusters.
Himtol, 73529.

Danthonia jacquemontii Bor in Kew Bull. 1952.80.1952.
Densely tufted herbs, 30-75 cm high. Panicles 5-7 cm long, congested. Spikelets with tufts of hairs at base.
Dharansi to Dibrugheta, 73222, 73251, 73524.

Deyeuxia pulchella (Griseb.) Hook.f. Fl. Brit. Ind. 7:268.1896.
Herbs, 30-50 cm high. Panicles congested. Spikelets purplish, awn above middle.
Dharansi, 73445.

Deyeuxia scabrescens (Griseb.) Munro ex Duthie in Atkins. Gaz. N. W. Ind. 628.1882.
Herbs. 70 cm high. Panicles congested. Spikelets green, scabrid, awn median.
Dharansi to Dibrugheta, 73224, 73404.

Festuca kashmiriana Stapf in Hook.f. Fl. Brit. Ind. 7:351.1896.
Herbs. 20-25 cm high. Leaves setaceous. Panicle 4-6 cm long. Spikelets green or purple tinged.
Dharansi, 73447.

Festuca polycolea Stapf in Hook.f. Fl. Brit. Ind. 7:349.1896.
Tufted herbs, 25-30 cm high. Leaves setaceous. Panicle 4-6 cm long. Spikelets green.
Ramani to Bhujgara, 73330.

Poa alpina L. Sp. Pl. ed. 1:67.1753.
Tufted herbs, 25-30 cm high. Spikelets ovate, green.
Dharansi, 73450.

Poa araratica Trautv. in Act. Hort. Petrop. 2:486.1873.
Densely tufted herbs, *ca* 30 cm high. Inflorescence 1.0—3.0 cm long. Spikelets purplish.
Ramani-Bhujgara, 73343.

Poa pagophila Bor in Kew Bull. 1949, 239. 1949.
Herbs, 30-40 cm high. Spikelets lax, purplish.
Ramani-Bhujgara, 73353.

Stipa roylei (Nees) Mez in Fedde, Rep. Sp. Nov. 17.207.1921.
Densely tufted herbs, *ca* 1.0 m high. Panicle narrow, 10-20 cm long, spikelets green.
Dibrugheta, 73407.

Trisetum clarkei (Hook. f.) R. R. Stewart in Brittonia 5.4.431. 1945.
Tufted herbs, 30-50 cm high. Stem below the panicle hairy. Spikelets brownish.
Ramani to Bhujgara, 73307, 73314, 73352.

GYMNOSPERMS

EPHEDRACEAE

Ephedra gerardiana Wall. ex Stapf in Die Artender Gatt. Ephedra 75. 1889. emend. Florin, Kungl. Sv. Vetensk. Handl. Ser. 3, 12(1): 21.1933.
Tufted, low shrubs, 10-20 cm high. Flowers unisexual. Fruit red, ovoid, with sticky juice.
Bhujgara to Ramani 73800.

CUPRESSACEAE

Juniperus wallichiana Hook.f. ex Parl. in DC. Prodr. 16(2): 482.1868.
Shrubs with procumbent stems. Leaves of two kinds, subulate or scale like. Fruits blue-black when ripe.
Dibrugheta to Deodi, 73411.

TAXACEAE

Taxus baccata L. Sp. Pl. 1040.1753.
Tree, 10-15 m high. Leaves bifarious, linear. Flowers dioecious. Female flowers solitary, seated on a cup-shaped disk. On way to Himtoli from Tolma, 73208; Dibrugheta to Sonnwara, 73749.

PINACEAE

Abies spectabilis (D. Don.) Spach, Hist. Nat. Veg. Phan. 2: 422.1842.
Tree, 25-30 m high. Leaves distichous, lower surface with two pale glaucous bands on either side of the midrib. Cones oblong, dark purple. Dibrugheta, 73284.

Picea smithiana (Wall.) Boiss. Fl. Or. 5:700.1881.
Tree, 15-60 m high with drooping branches. Leaves needle-like, stiff and pointed. Cones cylindrical, pendulous. Dibrugheta to Pangrani, 73758.

Pinus wallichiana A. B. Jackson in Kew Bull. 1938:85.1938.
Tree, 15-30 m high. Leaves slender, in bundles of three. Cones solitary, pendulous. Dibrugheta, 73283.

PTERIDOPHYTES

ADIANTACEAE

Adiantum capillus-veneris L. Sp. Pl. 2:1096.1753.
Tufted herbs, 20-30 cm high. Stipe black. Sori semilunar or crescent shaped. Dibrugheta to Sonnwara, 73756.

ASPIDIACEAE

Phanerophlebia caryotideae (Wall.) Copeland, Gen. Fil. 111. 1947.
Tufted herbs, ca 50 cm high. Sori globose. Pangrani, 73770.

ASPLENIACEAE

Asplenium septentrionale (L.) Hoffm. Deutschl. Fl. 2:12.1795.
Tufted herbs, 7-15 cm high. Stipes many. Fronds linear. Sori long. Dharansi to Dibrugheta, 73223.

Asplenium trichomanes L. Sp. Pl. 1080. 1753.
Tufted herbs, ca 15 cm high. Stipe black. Sori linear. Himtoli, 73493.

CRYPTOGRAMMACEAE

Cryptogramma crispa (L.) R. Br. ex Hook. Gen. Fil.t. 115.B. 1842.
Tufted glabrous herbs. Scales pale-brown. Sterile and fertile fronds different. Sori terminal on the veins. Deodi-Ramani, 73291.

DRYOPTERIDACEAE

Dryopteris brunnoniana (Wall.) O. Ktze. Rev. Gen. Pl. 2.812. 1891.
Densely tufted herbs, stipes clothed with large dark-brown scales. Dharansi, 73423.

Polystichum lachenense (Hook.) Bedd., Ferns Brit. Ind. t. 32.1865.
Densely tufted herbs. Rhizome very scaly. Sori 6-12 to a pinna, indusium incised. Ramani to Bhujgara, 73331.

Polystichum prescottianum Wall. ex Moore, Ind. 101.1858.
Stipe short with straw coloured or blackish scales. Dibrugheta to Dharansi, 73419, 73477.

OPHIAGLOSSACEAE

Botrychium lunaria (L.) Sw. Schrad. Journ. 1800(2).110. 1801.
Rhizome enclosed by brown sheaths. Frond solitary. Pinnae 4-7 pairs. Dibrugheta to Deodi, 73987.

OSMUNDACEAE

Osmunda claytoniana L. Sp. Pl. 1066. 1753.
Tufted *ca* 1.0 m high, clothed with ferruginous tomentum when young. Uppermost and lowest pinnae barren, intermediate fertile. Himtoli, 73550.

POLYPODIACEAE

Lepisorus excavatus (Bory) Ching, Bull. Fan. Mem. Inst. Biol. Bot. 4:68.1933.
Rhizome creeping. Fronds *ca* 30 cm long. Sori more or less deeply sunk.
Dharansi to Dibrugetha, 73218; Dharansi to Himtoli, 73483.

SINOPTERIDACEAE

Notholaena marantae (L.) Br. Prod. Fl. N. Holl. 146.1810.
Rhizome densely paleaceous with soft silky ferruginous scales. Fronds beneath densely clothed with ferruginous scales. Dibrugetha to Deodi, 73257.

WOODSIACEAE

Woodsia cycloloba Hand.-Maz. in Symb. Sinic. 6:19.t.1.f. 5.1925.

Densely tufted 3-6 cm high, glandular-hirsute herb with creeping rhizome and round sori on the veins.
Above Ramani on way to Bhujgara, 73332.

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LITERATURE CITED

- Khacher, Lavkumar 1978. The Nanda Devi Sanctuary—1977 in *Journ. Bomb. nat. Hist. Soc.* 75:868-887.
- Maruo Yuji 1979(1982.). Geology and Metamorphism of the Nanda Devi Region, Kumaon Higher Himalaya, India, in *Himalayan Geology* 9(1) : 3-17.

