

## Some new and noteworthy records of Hepaticae and Anthocerotae from Western Himalaya, India

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**Abstract** – Thirty six taxa of liverworts and two of hornworts have been recorded from Western Himalaya, India. Of these, three taxa, viz., *Frullania dilatata* (L.) Dumort. subsp. *dilatata*, *Lejeunea obfusca* Mitt. and *Scapania glaucocephala* (Taylor) Austin, are new records for India. Whereas 13 species are new to the Western Himalayan region of the country, eighteen species are new to the State of Himachal Pradesh, while three species have been recorded for the first time from the State of Uttaranchal.

**New distributional records / Hepaticae / Anthocerotae / Western Himalaya / India**

### INTRODUCTION

During the course of bryological explorations in Western Himalaya in general and conservation areas of the State of Himachal Pradesh in particular, the authors came across some interesting findings of liverworts and hornworts. A critical review of relevant literature (Mitten, 1861; Stephani, 1900-1924; Gola, 1914; Kashyap, 1929, 1932; Chopra, 1943; Amakawa, 1964; Srivastava, 1964; Kachroo, 1969, 1970a, b, 1973; Bir, 1970, 1975; Mizutani, 1971; Bir & Chopra, 1972; Srivastava & Udar, 1975a, b, 1976; Kachroo & al., 1977; Srivastava, 1979; Awasthi & Srivastava, 1988; Long & Grolle, 1990; Asthana & Srivastava, 1991; Parihar & al., 1994; Srivastava & Srivastava, 1995; Srivastava & Dixit, 1996; Bapna & Kachroo, 2000; Dhar & al., 2002; Srivastava & Srivastava, 2002; Singh, 2002; Long, 2005, 2006) revealed three taxa viz., *Frullania dilatata* (L.) Dumort. subsp. *dilatata*, *Lejeunea obfusca* Mitt. and *Scapania glaucocephala* (Taylor) Austin, as new records for Indian bryoflora. Whereas 13 species are new to the Western Himalaya, the rest of them show extended distribution to either Himachal Pradesh or Uttaranchal.

The specimens cited in text have been deposited in Cryptogamic Section of Herbarium of Botanical Survey of India, Northern Circle, Dehradun (BSD) and Central National Herbarium, Botanical Survey of India, Howrah (CAL).

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## ENUMERATION

### Aneuraceae

#### *Riccardia tenuicostata* Schiffn.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Majhan, on rock slopes (*ca* 2000 m), 17.09.2003, *S.K. Singh* 104314; Barshanger, on tree trunk (*ca* 2000 m), 19.09.2003, *S.K. Singh* 104347; Lapah, Deodar forest, on rock slope, (*ca* 2200 m), 021.09.2003, *S.K. Singh* 104368, 104387; Tirthan valley, Kharongcha, on tree logs (*ca* 1950 m), 26.09.2003, *S.K. Singh* 104445.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (West Bengal: Darjeeling), Western Ghats (Tamil Nadu); Indonesia; Singapore (Srivastava & Udar, 1976; Bapna & Kachroo, 2000b).

### Anthocerotaceae

#### *Anthoceros bharadwajii* Udar & Asthana

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley: Shinda, moist rock slope (*ca* 2100 m), 09.09.2003, *S.K. Singh* 101501; Bagishaidi, on moist rock slope (*ca* 2100 m), 12.09.2003, *S.K. Singh* 101543; Tirthan valley: Shilt, on moist rock slope (*ca* 2900 m), 11.09.1999, *P.V. Karunakaran* 99969.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (West Bengal: Darjeeling, Meghalaya, Arunachal Pradesh, Manipur); Western Ghats (Maharashtra, Karnataka, Kerala) (Asthana & Srivastava, 1991).

#### *Phaeoceros carolinianus* (Michx.) Prosk.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Ropa, moist rock slope (*ca* 1450 m), 13.02.2002, *S.K. Singh* 99564; Tirthan valley, Bathad, moist rock slope (*ca* 1400 m), 10.02.02, *S.K. Singh* 99549.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (West Bengal: Darjeeling, Sikkim, Arunachal Pradesh), Central India (Madhya Pradesh), Western Ghats (Tamil Nadu); Nepal; Bhutan; Myanmar; Japan; Sri Lanka; Africa; Europe; North America (Piippo, 1990; Long & Grolle, 1990; Asthana & Srivastava, 1991; Hasegawa, 1991; Schuster, 1992b; Paton, 1999).

### Aytoniaceae

#### *Mannia perssonii* Udar & Chandra

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Tirthan valley, Bathad, moist soil over rock slope (*ca* 1400 m), 10.02.2002, *S.K. Singh* 99545.

**New to Himachal Pradesh;** earlier known only from its type locality Gangotri in Uttaranchal, Western Himalaya (Udar & Chandra, 1965).

### Fossombroniaceae

#### *Fossombronia pusilla* (L.) Dumort.

**Western Himalaya:** Uttaranchal, Dehradun, Mathronwala, on moist ground (*ca* 750 m), 13.02.2003, *S.K. Singh* 101351; 11.12.2003, *S.K. Singh* 104760.

**New to Western Himalaya;** earlier reported in India from Western Ghats (Tamil Nadu: Ootacamund); China; Africa; Europe; America (Srivastava & Udar, 1975a; Schuster, 1992a; Piippo, 1990; Paton, 1999).

## Frullaniaceae

### *Frullania dilatata* (L.) Dumort. subsp. *dilatata*

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Guidi, on bark of trees (*ca* 1800 m), 10.09.2003, S.K. Singh 101509, 101510; Bagishaidi, on moist rock slope (*ca* 2100 m) 10.09.2003, S.K. Singh 101520; Bagishaidi, on bark of trees (*ca* 2100 m), 12.09.2003, S.K. Singh 101547; Shanger, Deodar forest, on moist rock slope (*ca* 2100 m), 19.09.2003, S.K. Singh 104339, 101550; Sara thatch, on bark of trees (*ca* 2400 m), 24.09.2003, S.K. Singh 104417, 104409; Tirthan valley: Rolla – Basu, on bark of trees (*ca* 2400 m), 12.09.2001, D.K. Singh & S.K. Singh 99143. Jalori Pass – Shoja, moist rock slope (*ca* 2800 m), 04.06.2002, S.K. Singh 99782.

**New to India;** earlier reported from China; C.I.S.; Turkey; North Africa (incl. Canary Island and Madeira); Europe (Hattori & Thaithong, 1978a, b; Piippo, 1990; Paton, 1999; Schumacker & Vána, 2000).

Hattori (1982) reexamined the Indian specimens identified by Hattori and Thaithong (1978a, b) as *F. dilatata* and found the stylus in these plants to be minute, composed of a single row of about 4-5 uniseriate cells, often 2 cells wide at the very base. Taking this difference into consideration he (Hattori, 1982) treated Indian forms as *F. dilatata* (L.) Dumort. subsp. *asiatica* S.Hatt. In present study, some interesting plants having stylus up to 11-cells long, uniseriate distally up to 4-5 cells and 3-5 cells wide at base were encountered, which are similar to European plants. This, therefore, constitutes first authentic record of the typical forms of *F. dilatata* from India.

### *Frullania pariharii* S.Hatt. & Thaith.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Bida Shanger, Deodar forest, moist rock slope (*ca* 1900 m), 16.02.2002, S.K. Singh 99583; Shakti – Maror, rock slope, (*ca* 2500 m), 28.05.2002, S.K. Singh 99734; Bagi, moist rock slope, (*ca* 2000 m), 13.09.2003, S.K. Singh 101576; Majhan, moist rock slope (*ca* 2000 m), 17.09.03, S.K. Singh 101596.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (West Bengal: Darjeeling); Nepal (Hattori & Thaithong, 1978a, b).

## Geocalyceae

### *Chiloscyphus campanulatus* Steph.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Tirthan valley, Kharongcha – Rolla, on rock slope, along inspection path (*ca* 1950 m), 11.09.2001, D.K. Singh & S.K. Singh 99134.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Jammu & Kashmir, Uttaranchal) (Stephani, 1906; Srivastava & Srivastava, 2002).

### *Chiloscyphus himalayensis* Steph.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Neuli, moist rock slopes (*ca* 1500 m), 12.02.2002, S.K. Singh 99555; Majhan, rock slope (*ca*

2000 m), 17.09.2003, *S.K. Singh* 104305; Sara thatch (ca 2400 m), 24.09.2003, *S.K. Singh* 104404; Ropa, on rock slope (ca 1600 m), 26.09.2003, *S.K. Singh* 104428; Tirthan valley, Gunmatrao, rock slopes (ca 3300 m), 12.09.1999, *P.V. Karunakaran*, 99971; Kharongcha-Rolla, rock slope, along inspection path (ca 1950 m), 11.09.2001, *D.K. Singh & S.K. Singh* 99129; Kharongcha, rock slope, along inspection path (ca 1900 m), 26.09.2003, *S.K. Singh* 104449.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal) (Stephani, 1906; Srivastava & Srivastava, 2002).

***Geocalyx graveolens*** (Schrad.) Nees

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Tirthan valley, Rolla, Deodar forest (ca 2100m), 02.08.1999, *P.V. Karunakaran*, 99998. Jalori Pass-Sareusar lake, Deodar forest, moist rock slope (ca 3200 m), 03.06.2002, *S.K. Singh* 99765; Near Sareusar lake, on calcareous rock, 03.06.2002, *S.K. Singh* 99766; Shoja, rock slope (ca 2500 m), 05.06.2002, *S.K. Singh* 99784.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya; China; Bhutan; Japan; C.I.S.; Germany; Europe; North America (Schuster, 1980; Udar & *al.*, 1982; Piippo, 1990; Long & Grolle, 1990; Singh, 1997).

***Heteroscyphus pandei*** Abha Srivast. & S.C.Srivast.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Tirthan valley, Bathad, on soil over rock slope (ca 1400 m), 10.02.02, *S.K. Singh* 99535, 99539.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (West Bengal: Darjeeling, Sikkim, Manipur); Nepal (Srivastava & Srivastava, 2002).

***Lophocolea cuspidata*** (Nees) Limpr.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Lapah, Deodar forest, moist rock slope (ca 2200 m), 21.09.2003, *S.K. Singh* 104360.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (West Bengal: Darjeeling, Sikkim), Western Ghats (Kerala, Tamil Nadu); China; Japan; Africa; Europe; North America (Jones, 1953; Inoue, 1959; Schuster, 1980; Piippo, 1990; Srivastava & Srivastava, 2002).

**Jungermanniaceae**

***Jamesoniella autumnalis*** (DC.) Steph.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Shanger, Deodar forests, moist rock slope (ca 2100 m), 19.09.2003, *S.K. Singh* 104343; Lapah, rock slope (ca 2200 m), 21.09.2003, *S.K. Singh* 104365; Sara thatch, Deodar forest, rock slope (ca 2400 m), 24.09.2003, *S.K. Singh* 104416, 104419, 104420. Jalori Pass, Sareusar lake, on calcareous soil (ca 3200 m), 03.06.2002, *S.K. Singh* 99764.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (West Bengal: Darjeeling, Sikkim); China; Japan; Korea; C.I.S.; Caucasus; Europe; North America (Amakawa, 1959; Hattori, 1966; Schuster, 1969; Piippo, 1990; Paton, 1999; Zhu & So, 2001).

***Jungermannia infusca*** (Mitt.) Steph.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Shanger, Deodar forest, moist rock slope (ca 2100 m), 19.09.2003, *S.K. Singh* 104334.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (Assam); China; Taiwan; Japan (incl. Bonin Islands) (Robinson, 1964; Vána, 1975; Piippo, 1990).

*Jungermannia subrubra* Steph.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Neuli, on moist rock slope (ca 1500 m), 12.02.2002, S.K. Singh 99563; Shanger, on bark of tree (ca 2100 m), 19.09.2003, S.K. Singh 99555.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (West Bengal: Darjeeling, Sikkim); Nepal; Bhutan; Taiwan (Amakawa, 1967; Srivastava & Singh, 1986; Piippo, 1990; Long & Grolle, 1990).

**Lejeuneaceae**

*Lejeunea discreta* Lindenb.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Shakti – Maror, rock slope, (ca 2500 m), 28.05.2002, S.K. Singh 99734, 99732; Sara thatch, Deodar forest, rock slope (ca 2400 m), 04.09.2003, S.K. Singh 104403.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (West Bengal: Darjeeling), Western Ghats (Tamil Nadu); Nepal; China; Bhutan; Sri Lanka; Philippines; Indonesia; Japan; New Guinea (Mizutani, 1970, 1971; Piippo, 1990; Long & Grolle, 1990; Streimann, 1991).

*Lejeunea obfusca* Mitt.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Bagishaidi, on moist rock slope (ca 2100 m), 11.09.2003, S.K. Singh 101532; Kathal dhar, on bark of tree, 13.09.2003, S.K. Singh 101555; Tirthan valley, Kharongcha, on rock slope along inspection path (ca 1950 m), 26.09.2003, S.K. Singh 104444.

**New to India;** earlier recoded from Sri Lanka (Mitten, 1861; Mizutani, 1963). The species was so far known only through its type collected by Gardner from Sri Lanka. The species has, therefore, been collected for the first time since its type and present study constitutes its first record from India.

*Ptychanthus striatus* (Lehm. & Lindenb.) Nees

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Bah – Lapah, moist rock slope (ca 1800 m), 26.05.2002, S.K. Singh 99596.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (throughout), Central India, Western Ghats, Andaman & Nicobar Islands; Nepal; Bhutan; China; Taiwan; Myanmar; Philippines; Indonesia; Japan; Malaysia; Indonesia (Celebes); Sri Lanka; Samoa; New Zealand; New Guinea; Australia; Africa (wide spread palaeotropic species with a range from central Africa to western Pacific) (Mizutani, 1961; Awasthi & Srivastava, 1987; Piippo, 1990; Long & Grolle, 1990; Streimann, 1991; Zhu & So, 2001).

*Trocholejeunea infusata* (Mitt.) Verd.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Bah – Lapah, moist rock slope (ca 1800 m), 26.05.2002, S.K. Singh 99593.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (West Bengal: Darjeeling, Sikkim); Nepal; Bhutan; Philippines; China; Sri Lanka; Myanmar (Hattori, 1966; Awasthi & Srivastava, 1988; Piippo, 1990; Long & Grolle, 1990).

***Trocholejeunea sandvicensis*** (Gottsche) Mizut.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Shanger, Deodar forest, on rock slope (*ca* 2100 m), 19.09.2003, *S.K. Singh* 99583; Tirthan valley: Kharongcha, on tree trunk (*ca* 1950 m), 26.09.2003, *S.K. Singh* 104438.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (Sikkim), Western Ghats (Tamil Nadu); Pakistan; Nepal; Bhutan; Taiwan; China; Sri Lanka; Japan; Korea; Malaysia; Vietnam; Hawaii (Hattori, 1966; Awasthi & Srivastava, 1988; Piippo, 1990; Long & Grolle, 1990; Bapna & Kachroo, 2000b; Zhu & So, 2001; Zhu & Long, 2003).

**Metzgeriaceae*****Metzgeria consanguinea*** Schiffn.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Majhan, on tree trunk (*ca* 2000 m), 17.09.2003, *S.K. Singh* 104307.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (West Bengal: Darjeeling, Sikkim), Western Ghats (Tamil Nadu); Nepal; Bhutan; China; Sri Lanka; Japan; Indonesia; New Guinea; Africa; South America (Kuwahara, 1975, 1978, 1985; Hattori, 1966; Srivastava & Udar, 1975b; Piippo, 1990; Long & Grolle, 1990; So, 2003).

***Metzgeria lindbergii*** Schiffn.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Ropa, on rock slope (*ca* 1400 m), 13.02.2002, *S.K. Singh* 99588; Shakti – Maror, on rock slope (*ca* 2400 m), 28.05.2002, *S.K. Singh* 99730; Kadia, on moist rock slope (*ca* 1800 m), 13.09.2003, *S.K. Singh* 101564; Bagi, on moist rock slope (*ca* 2000 m), 13.09.2003, *S.K. Singh* 101573; Majhan, rock slope (*ca* 2000 m), 17.09.2003, *S.K. Singh* 104301, 104303; Shanger, Deodar forest, on tree logs (*ca* 2100 m), 19.09.2003, *S.K. Singh* 104321; Lapah, Deodar forest, moist rock slope 21.09.2003, *S.K. Singh* 104375, 104378, 104389; Tirthan valley, Kharongcha – Rolla, on tree trunk (*ca* 1950 m), 11.09.2001, *D.K. Singh & S.K. Singh* 99132; Kharongcha, on rock slope along inspection path (*ca* 1950 m), 26.09.2003, *S.K. Singh* 104436.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (West Bengal: Darjeeling, Sikkim, Assam); Nepal; Bhutan; China; Taiwan; Philippines; Japan; Korea; Russia (Sakhalin); Malaysia (Kuwahara, 1985; Piippo, 1990; Long & Grolle, 1990; So, 2003).

**Monosoleniaceae*****Monosolenium tenerum*** Griff.

**Western Himalaya:** Uttaranchal, Dehradun, Kaulagarh, BSI campus, Swarna Jayanti Udyan, on moist ground (*ca* 750 m), Dehradun, 21.10.2002, *D.K. Singh* 101240; 17.01.2003, *S.K. Singh* 101291; 27.01.2003, *S.K. Singh* 101297; 16.02.2003, *S.K. Singh* 101299; 26.02.2003, *S.K. Singh* 101300; 10.03.2003, *S.K. Singh* 101362; 26.03.2003, *S.K. Singh* 101377.

**New to Uttaranchal;** earlier reported in India from Western Himalaya (Himachal Pradesh: Sundernagar, Baijnath), Eastern Himalaya (Assam, Manipur); China; Taiwan; Japan (including Ryukyu); Hawaii (Griffith, 1849; Schiffner, 1893; Stephani, 1900; Kashyap, 1923; Hattori, 1952; Inoue, 1966; Yang, 1965; Piippo, 1990; Kapila & Kumar, 1995).

**Plagiochilaceae*****Plagiochila duthiana* Steph.**

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Khain, moist rock slope, (ca 1800 m), 10.09.2003, *S.K. Singh* 101507; Chungli, moist rock slope (ca 1750 m), 10.09.2003, *S.K. Singh* 101517; Kadia (ca 1800 m), moist rock slope (ca 1800 m), 13.09.2003, *S.K. Singh* 101562; Lapah, Deodar forest, moist rock surface (ca 2200 m), 21.09.2003, *S.K. Singh* 104363.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Jammu & Kashmir), Eastern Himalaya (Sikkim); Nepal; China; Bhutan; Pakistan; Japan (Stephani, 1906; Inoue, 1965, 1967; Hattori, 1971; Piippo, 1990; So, 2001).

***Plagiochila elegans* Mitt.**

**Western Himalaya:** Himachal Pradesh, Kullu, Shoja (near Jalori pass), moist rock slope (ca 2400 m), 05.06.2002, *S.K. Singh* 99796.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (West Bengal: Darjeeling, Sikkim); Nepal; Bhutan; China; Taiwan (Mitten, 1861; Hattori, 1971; Piippo, 1990; Long & Grolle, 1990; So & Grolle, 2000a).

***Plagiochila mundaliensis* Steph.**

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Lapah, Deodar forest, moist rock slope (ca 2200 m) 21.09.2003, *S.K. Singh* 104392; Tirthan valley, Kharongcha, moist rock slope (ca 1950 m), 26.09.2003, *S.K. Singh* 104439; Jathor, moist rock slope (ca 2700 m), 28.09.2003, *S.K. Singh* 104471; Jathor – Nara, moist rock surface, (ca 2800 m), 28.09.2003, *S.K. Singh* 104472; Tirthan valley: Rolla – Basu, Deodar forest, along inspection path (ca 2400 m), 12.09.2001, *D.K. Singh & S.K. Singh* 99145; Kharongcha, rock slope, along inspection path (ca 1950 m), 31.05.2002, *S.K. Singh* 104442; Rolla, moist rock surface (ca 2200 m), 27.09.2003, *S.K. Singh* 104457. Above Marhi, rock slope (ca 2400 m), 30.07.2002, *S.K. Singh* 101210. Shoja, moist rock slope (ca 2400 m), 05.06.2002, *S.K. Singh* 99798.

**New to Himachal Pradesh;** earlier reported from Western Himalaya (Uttaranchal) and Eastern Himalaya (Sikkim); Thailand (Stephani, 1906; Kashyap, 1932; Hattori, 1971; Srivastava & Dixit, 1996a; So & Grolle, 2000a).

***Plagiochila parvifolia* Lindenb.**

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Bihali, moist exposed rock slope (ca 1400 m), 09.02.2002, *S.K. Singh* 99532c; Neuli moist rock slope (ca 1500 m), 12.02.2002, *S.K. Singh* 99557, 99560; Ropa, moist rock slope (ca 1400 m), 13.02.2002, *S.K. Singh* 99566; Neuli moist rock slope (ca 1500 m), 13.02.2002, *S.K. Singh* 99570; Bah-Lapah, Deodar forest, on bark of trees, (ca 2200 m), 26.05.2002, *S.K. Singh* 99595, 99597, 99600; Shakti – Bah, on bark of trees (ca 2200 m), 31.05.2002, *S.K. Singh* 99751; Lapah, Deodar forest, moist rock slope (ca 2200 m), 21.09.2003, *S.K. Singh* 104379; Tirthan valley: Rolla, moist rock slope, along inspection path (ca 2100 m), 01.08.1999, *P.V. Karunakaran*, 99980; Kharongcha – Rolla, along inspection path (ca 1950 m), 11.09.2001, *D.K. Singh & S.K. Singh* 99133; Rolla, rock slope (ca 2200 m), 12.09.2001, *D.K. Singh & S.K. Singh* 99135; Rolla – Basu, Deodar forest, rock slope (ca 2000-2400 m), 12.09.2001, *D.K. Singh & S.K. Singh* 99156; Bathad, moist soil over rock (ca 1400 m), 10.02.2002, *S.K. Singh* 99548; Kharongcha, along inspection path (ca 1950 m), 31.05.2002, *S.K. Singh* 104442; Rolla, on rock boulder (ca 2200 m), 27.09.2003, *S.K. Singh* 104457. Shoja, moist rock slope (ca 2400 m), 05.06.2002, *S.K. Singh* 99792.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (Meghalaya, Sikkim), Western Ghats (Kerala: Eravikulam National

Park); China; Bhutan; Bangladesh; Sri Lanka; Myanmar; Indonesia; Philippines; Thailand; Vietnam; Japan; Korea; Papua New Guinea (Piippo, 1990; So, 2001; Nair & *al.*, 2005).

***Plagiochila retusa* Mitt.**

**Western Himalaya:** Himachal Pradesh, Kullu, Shoja (near Jalori pass), moist rock slope (*ca* 2400 m), 04.06.2002, *S.K. Singh* 99781; Shoja (near Jalori pass), moist rock slope (*ca* 2400 m), 05.06.2002, *S.K. Singh* 99788.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (West Bengal: Darjeeling, Sikkim); Nepal; Bhutan; China (Mitten, 1861; Inoue, 1965; Hattori, 1966; So, 2001).

***Plagiochila richteri* Steph. ex S.C.Srivast. & R.Dixit**

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Sara thatch, moist rock slope (*ca* 2400 m), 24.09.2003, *S.K. Singh* 104418.

**New to Himalaya;** earlier reported in India from Western Ghats, Tamil Nadu (Vegavurrai) (Srivastava & Dixit, 1996a). Recently So & Grolle (2000b) reduced this species to the synonym of *P. nepalensis* Lindenb. But in the presence of highly alveolate leaf cells with medium to large trigones, *P. richteri* is distinct from not only the former but other species of the genus as well.

***Plagiochila sciophila* Nees**

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Bida Shanger, moist rock slope (*ca* 1900 m), 15.02.2002, *S.K. Singh* 99577; Shanger, Deodar forest, rock slope (*ca* 2100 m), 16.02.2002, *S.K. Singh* 99580; Shakti – Maror, moist rock slope (*ca* 2400 m), 28.05.2002, *S.K. Singh* 99733; Lapah, moist rock slope (*ca* 2200 m) 21.09.2003, *S.K. Singh* 104390; Tirthan valley, Kharongcha, along inspection path, rock slope (*ca* 1950 m), 26.09.2003, *S.K. Singh* 104429, 104437, 104443, 104452. Shoja (near Jalori pass), moist rock slope (*ca* 2400 m), 05.06.2002, *S.K. Singh* 99786.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Jammu & Kashmir), Eastern Himalaya (West Bengal: Darjeeling, Sikkim, Assam), Western Ghats (Kerala: Eravikulam National Park); Pakistan; Nepal; Bhutan; China; Japan; Korea; Philippines; Malaysia; Vietnam; Thailand; Indonesia; Papua New Guinea; Samoa; North America (Hattori, 1966; Schuster, 1980; Inoue, 1984; Piippo, 1990; Long & Grolle, 1990; So, 2001; Zhu & So, 2001; Nair & *al.*, 2005).

**Ricciaceae**

***Riccia beyrichiana* Hampe**

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Tirthan valley, Kharongcha, on moist rock along inspection path (*ca* 1950 m), 11.09.2001, *D.K. Singh* & *S.K. Singh* 99108. Lahoul and Spiti, Lahoul valley, Chatru, in crevices of rock (*ca* 3600 m), 15.09.2001, *D.K. Singh* & *S.K. Singh* 99182, 99183, 99187, 99188, 99191, 99192, 99193, 99194, 99195, 99196; Kullu, below Marhi, rock slope (*ca* 2500 m), 31.07.2002, *S.K. Singh* 101219, 101222; Below Kothi, rock slope (*ca* 1900 m), 01.08.2002, *S.K. Singh* 101234.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (Meghalaya); North Africa; Europe; North America (Srivastava, 1964; Schuster, 1992b; Paton, 1999).

***Riccia cruciata* Kashyap**

**Western Himalaya:** Uttaranchal, Dehradun, Mathronwala, on moist sandy soil (*ca* 750 m), 13.02.2003, *S. K. Singh* 101350; 11.12.2003, 104779; Kuwanwala, on moist sandy soil (*ca*



750 m), 11.12.2003, S.K. Singh 104757, 104758; Robber's cave, on moist calcareous soil (ca 750 m), 11.12.2003, S.K. Singh 104739.

**New to Western Himalaya:** earlier reported in India from Eastern Himalaya (Sikkim, Assam, Meghalaya), Gangetic plains (Uttar Pradesh), Punjab & West Rajasthan (Punjab, Rajasthan), Western Ghats (Kerala); Pakistan (Kashyap, 1929; Srivastava, 1964; Kachroo & al., 1977).

### *Riccia frostii* Austin

**Western Himalaya:** Uttaranchal, Dehradun, Mathronwala, sandy soil along riverside (ca 750 m), 13.02.2003, S.K. Singh 101353, 101354.

**New to Uttaranchal;** earlier reported in India from Western Himalaya (Jammu & Kashmir), Eastern Himalaya (Sikkim, Manipur), Gangetic plains (Uttar Pradesh, West Bengal), Punjab & West Rajasthan (Rajasthan), Western Ghats (Tamil Nadu, Kerala); Bangladesh; Pakistan; China; Africa; Europe; America (Srivastava, 1964; Kachroo & al., 1977; Piippo, 1990; Schuster, 1992b; Schumacker & Váňa, 2000).

### *Riccia sorocarpa* Bischoff.

**Western Himalaya:** Uttaranchal, Dehradun, Kaulagarh, BSI campus, moist ground (ca 750 m), 21.11.2002, S.K. Singh 99398.

**New to Uttaranchal;** earlier reported in India from Western Himalaya (Jammu & Kashmir: Ratnijhal), Eastern Himalaya (West Bengal: Darjeeling); Japan; China; Africa; Europe; North America (Srivastava, 1964; Kachroo & al., 1977; Perold, 1989; Piippo, 1990; Schuster, 1992b; Paton, 1999).

## Scapaniaceae

### *Scapania ferruginea* (Lehm. & Lindenb.) Gottsche

**Western Himalaya:** Himachal Pradesh, Kullu, on way from Jalori Pass-Sareusar lake, Deodar forest, decayed logs (ca 3200 m), 03.06.2002, S.K. Singh 99762, 99768; Jalori pass-Shoja, rock slope (ca 2800 m), 04.06.2002, S.K. Singh 99766, 99778.

**New to Western Himalaya;** earlier reported in India from Eastern Himalaya (West Bengal: Darjeeling, Sikkim); Nepal; Bhutan; China; Taiwan; Indonesia (Amakawa, 1964; Piippo, 1990; Long & Grolle, 1990).

### *Scapania glaucocephala* (Taylor) Austin

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Shanger, Deodar forest, rock slopes (ca 2100 m), 19.09.2003, S.K. Singh 104343; Lapah, Deodar forest, rock slopes (ca 2200 m), 21.09.2003, S.K. Singh 104365, 104385.

**New to India;** earlier reported from Finland in Europe and North-West Greenland; U.S.A. (Schuster, 1974).

### *Scapania parva* Steph.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Lapah, Deodar forest, rock slopes (ca 2200 m), 21.09.2003, S.K. Singh 104352, 104391; Tirthan valley, Kharongcha on rock slope, along inspection path (ca 1950 m), 26.09.2003, S.K. Singh 104448.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Jammu & Kashmir, Uttaranchal) Eastern Himalaya (West Bengal: Darjeeling, Sikkim); China; Japan; Hawaii (Stephani, 1910; Kashyap, 1932; Amakawa, 1964; Srivastava & Srivastava, 1995; Piippo, 1990).

## Targioniaceae

### *Cyathodium aureonitens* (Griff.) Mitt.

**Western Himalaya:** Himachal Pradesh, Kullu, Great Himalayan National Park, Sainj valley, Bagishaidi, on moist rock slope (ca 2100 m), 12.09.2003, S.K. Singh 101540; Ghatghar, on moist rock slope (ca 2000 m) 13.09.2003, S.K. Singh 101566; Tirthan valley, Durga thatch, on rock slope in very moist places (ca 2700 m), 13.09.2001, D.K. Singh & S.K. Singh 99161.

**New to Himachal Pradesh;** earlier reported in India from Western Himalaya (Uttaranchal), Eastern Himalaya (West Bengal: Darjeeling, Sikkim, Assam), Western Ghats (Maharashtra); Myanmar; Indonesia; Vietnam; Africa (Griffith, 1849; Srivastava & Dixit, 1996b).

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